AD-A241 244

JMENTATION PAG

Form Approved
OMB No. 0704-0188

...n is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, ...ering and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this ...ucing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson ...and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

2. REPORT DATE
23 Oct 89

3. REPORT TYPE AND DATES COVERED
Summary Aug 88 - Oct 89

4. TITLE AND SUBTITLE
Technology Insertion (TI)/Industrial Process Improvement (IP) Task Order No. 1 Contract Summary Report/Quick Fix Plan for 49 RCC's across The Command

5. FUNDING NUMBERS
Contract

6. AUTHOR(S)
McDonnell Douglas Missile Systems Company

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
McDonnell Douglas Missile Systems Company
St. Louis, Missouri 63166

8. PERFORMING ORGANIZATION REPORT NUMBER
F33600-88-D-0567

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
HQ AFLC/LGME
WPAFB OH 45433

10. SPONSORING/MONITORING AGENCY REPORT NUMBER
F33600-88-D-0567

11. SUPPLEMENTARY NOTES
Prepared in cooperation with OC-ALC, OO-ALC, SA-ALC, SM-ALC, WR-ALC, AGMC & HQ AFLC.

12a. DISTRIBUTION/AVAILABILITY STATEMENT
Distribution Statement A

12b. DISTRIBUTION CODE

13. ABSTRACT (Maximum 200 words)

Technology Insertion (TI)/Industrial Process Improvement (IPI) Summary Report for AFLC Command. This document contains Focus Study and Quick Fix Recommendations for 49 Resource Control Centers (RCC's). These RCC's are:
- 7 at OO-ALC (MAN Division)
- 20 at OC-ALC (MAT, MAB Divisions)
- 7 at SA-ALC (MAT & MAB Divisions)
- 7 at SM-ALC (MAN Division)
- 7 at WR-ALC (MAN Division)
- 1 at AGMC (Gyros)

Also includes Sinulation Modeling info for these RCC's

14. SUBJECT TERMS
Summary, Command Summary, AFLC.

15. NUMBER OF PAGES
100

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	Unclassified

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. Z39-18
298-102

TECHNOLOGY INSERTION-ENGINEERING SERVICES
PROCESS CHARACTERIZATION
TASK ORDER NO. 1

VOLUME I
SUMMARY

CONTRACT SUMMARY REPORT AND QUICK FIX PLAN
23 OCTOBER 1989

PRELIMINARY

CONTRACT NO. F33600-88-D-0567
CDRL SEQUENCE NO. B008 AND B007

A-1

MCDONNELL DOUGLAS
McDonnell Douglas Missile Systems Company
St. Louis, Missouri 63166-0516 (314) 232-0232

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS AND ABBREVIATIONS

AFLC	AIR FORCE LOGISTICS COMMAND
AFLCP	AIR FORCE LOGISITICS COMMAND PAMPHLET
AFR	AIR FORCE REGULATION
AGMC	AEROSPACE GUIDANCE AND METROLOGY CENTER
ALC	AIR LOGISTICS CENTER
ATE	AUTOMATIC TEST EQUIPMENT
CEO	CHIEF EXECUTIVE OFFICER
CSD	CONSTANT SPEED DRIVE
CSR	CONTRACT SUMMARY REPORT
DCS	DEPUTY CHIEF OF STAFF
DLS	DIRECT LABOR SAVINGS
DOD	DEPARTMENT OF DEFENSE
DPAH	DIRECT PRODUCT ACTUAL HOURS
DPSH	DIRECT PRODUCT STANDARD HOURS
FSR	FOCUS STUDY RECOMMENDATION
GRU	GYROSCOPE REFERENCE UNIT
GTE	GAS TURBINE ENGINE
HQ	HEADQUARTERS
ID	IDENTIFICATION
LIFT	LOGISTICS IMPROVEMENT OF FACILITIES AND TECHNOLOGY
MA	DIRECTORATE OF MAINTENANCE
MDC	MCDONNELL DOUGLAS CORPORATION
MDMSC	MCDONNELL DOUGLAS MISSILE SYSTEMS COMPANY
MM	DIRECTORATE OF MATERIAL MANAGEMENT
MTBF	MEAN TIME BETWEEN FAILURES
MTTR	MEAN TIME TO REPAIR
NPV	NET PRESENT VALUE
QFP	QUICK FIX PLAN
PCN	PART CONTROL NUMBER
PDM	PROGRAMMED DEPOT MAINTENANCE
PM	PREVENTATIVE MAINTENANCE

QP4	QUALITY, PEOPLE, PRODUCT, PERFORMANCE, PROCESS
RCC	RESOURCE CONTROL CENTER
SOW	STATEMENT OF WORK
SWRI	SOUTHWEST RESEARCH INSTITUTE
TI-ES	TECHNOLOGY INSERTION-ENGINEERING SERVICES
TO	TASK ORDER
TQM	TOTAL QUALITY MANAGEMENT
UDOS	UNIVERSAL DEPOT OVERHAUL SIMULATOR
WCD	WORK CONTROL DOCUMENT
WIP	WORK IN PROCESS

PREFACE

This program was initiated as one part of the Air Force Logistics Command (AFLC) approach to Total Quality Management (TQM). Specifically, the intent is to have an outside agency look at AFLC production operations and make recommendations concerning process improvement and technology utilization improvement. The initial contract is for a one year period with four option years. The focus of the current effort is an industrial engineering assessment of specific Resource Control Centers (RCCs) utilizing simulation technology and Taguchi based experimentation as tools.

Insertion of these tools into the AFLC community allows for the use of simulation modeling in decision making. The major benefit of this approach is the ability to look at a To-Be condition without the expenditure of capital assets. Simulation also allows for a method of determining wartime capabilities and identifying generic equipment or personnel to meet surge requirements by individual weapon system and Resource Control Center.

Implementation of this program has followed TQM principles. The approach has been to develop AFLC/MDMSC teams at each of the five Air Logistics Centers (ALCs) and the Aerospace Guidance and Metrology Center (AGMC). This team approach has proven to be very beneficial and important in easing potential communication barriers.

This Contract Summary Report (CSR) addresses the first Task Order (TO) under contract. Task Order No. 1 was to perform process characterization for a total of 49 RCCs for all Air Logistics Centers and the Aerospace Guidance and Metrology Center.

TASK ORDER NO. 1
PROCESS CHARACTERIZATION

CONTRACT SUMMARY REPORT AND QUICK FIX PLAN

EXECUTIVE SUMMARY

As public support for defense expenditures diminishes, it becomes increasingly important to maintain adequate readiness with existing weapon systems. Essential to this state of readiness is the capability to repair and remanufacture these weapon systems in a high quality, cost effective, and efficient manner. The Federal Government has established a goal that there will be a 20 percent improvement in productivity by the year 1992. The Department of Defense (DoD) has implemented a program to make Total Quality Management (TQM) applicable to every activity within DoD, and is also looking at depot modernization in order to take a systematic approach to reducing the costs of repair and remanufacture of existing and future DoD weapon systems.

The Technology Insertion Engineering Services (TIES) program is closely aligned with each of these initiatives. We are assessing depot operations in order to improve the quality of the repair/remanufacturing processes. These improvements will result in lower annual operating costs for the command. For example, Task Order No. 1 had as its objectives:

- Become familiar with Aerospace Guidance and Metrology Center and the five Air Logistics Centers (ALCs) Maintenance Directorate operations.
- Demonstrate use of the process characterization methodology.
- Develop selected Resource Control Center (RCC) process baselines which can be utilized for a measure of future improvements.
- Create simulation models of the selected RCCs.
- Utilize simulation models for performance of experimentation to evaluate potential changes.
- Develop quick fix recommendations.
- Identify focus study areas for future investigation.

We have met these objectives as evidenced by successful validation of the simulation model at all locations (OO-ALC in process) and the anticipated savings associated with quick fixes and focus studies.

TASK ORDER NO. 1
PROCESS CHARACTERIZATION

We believe that the results of Task Order No. 1 are impressive and that the projected savings to the command are significant. This first task order included upgrade of the Universal Depot Overhaul Simulator (UDOS) model which can now support simulation of virtually any RCC in the command. This was a large effort and resulted in successful demonstration and validation of the model at all locations (OC-ALC in process). This model and methodology are proving to be a valuable tool for AFLC managers and engineers.

In many instances the ALCs are identifying process improvements and are actively pursuing these at the local level. We have attempted not to repeat these efforts in this report. There are some quick fixes and observations that are already in work and are referenced in the report to lend support to those efforts.

We were able to identify numerous areas for improved productivity.

a) There are 18 focus studies that have the potential of saving AFLC over $5M annually in budget savings and over $24M in cost avoidance due to potential reductions in work in process inventory.
b) There are 72 quick fixes that have the potential of saving AFLC over $6M annually.
c) This represents a 4.2% reduction in current operating costs for the 42 RCCs addressed.
d) Total savings over a five year period are estimated at over $40M.
e) In addition to focus studies and quick fixes 357 observations have been documented as potential areas of improvement.

All the RCCs characterized are currently meeting production requirements. Computer simulations indicate that all but eleven can meet projected war time surge requirements with current resources. These results are addressed in greater detail in the appropriate ALC volume. There is a definite "can do" attitude on the shop floor and people are eager to improve. The QP4 program is a dynamic example of TQM and should receive continuous support from all levels of management. Management must also be aware that there is substantial room for improvements in productivity and cost-effectiveness.

Although production requirements are met, equipment and facilities are sometimes obsolete and costs are often unnecessarily high. The TIES program has highlighted a major problem at all ALCs concerning the lack of historical data. Accurate data is not only critical to the TI effort but is essential to effective management. Data problems encountered include questionable use of direct product standard hours as a measurement tool, lack of data reflecting actual flow hours, and insufficient maintenance and repair data.

Air Force Logistics Command (AFLC) has done an admirable job of supporting the operating commands of the Air Force and still does so. However the cost of this support is very high and hopefully this program will in some significant way help to reduce those costs. By and large we found that the major obstacle to productivity improvement lies in the areas of management and organization. Some possible areas for improvement include:

a) Place responsibility, authority and accountability for production <u>and</u> the processes it uses in a single organization.
b) Place engineering support on the shop floor to update standards and work with shop floor personnel to continually improve processes.
c) Establish performance measures based on actual performance data.
d) Place decision making at the lowest level in the organization thereby empowering the individual employees to accept full responsibility and accountability for their jobs.
e) Require management at all levels to be more visible on the shop floor.

We believe the Technology Insertion program has significant potential to the command. This first Task Order has proven that the use of simulation modeling has definite application in the repair/remanufacturing area. Continuous improvement of this model and the engineering assessment methodology should produce even greater potential savings as the TIES program matures.

TASK ORDER NO. 1
PROCESS CHARACTERIZATION

1.0 INTRODUCTION

This Contract Summary Report (CSR) presents the initial results of Process Characterization performed by the McDonnell Douglas Missile Systems Company (MDMSC) under Task Order No. 1 of the Air Force Logistics Command (AFLC) Technology Insertion-Engineering Services Program. This program was initiated as one part of the AFLC approach to Total Quality Management (TQM). Specifically, the intent is to have an outside contractor (MDMSC) provide the engineering services to assess selected RCCs at the Air Logistics Centers (ALCs) and the Aerospace Guidance and Metrology Center (AGMC) and provide recommended improvements to their repair and remanufacturing processes. These recommendations are the result of Industrial Engineering assessments supported by process simulation modeling and experimentation techniques using the Taguchi Method for Quality Engineering.

TO No. 1 comprises 49 Resource Control Centers (RCCs) which are, for the purposes of this task order, further subdivided into three blocks. Blocks I, II, and part of III include RCCs from AGMC (1), OC-ALC (13), SA-ALC (7), SM-ALC (7), and WR-ALC (7). With the exception of the OC-ALC and OO-ALC reports, all other CDRL submittals are final effective 25 September 1989.

Volume III (OC-ALC) final report will be submitted on 23 October, 1989. The final report for Volume IV (OO-ALC) and Volume I (Summary) will be submitted 15 December 1989. Table 1.0-1 depicts the RCC breakdown by ALC and block.

There are seven volumes contained in the CSR Final Report. Each volume is dedicated to a specific ALC and AGMC as well as a Summary Volume. Paragraph numbering is reserved so that each volume and associated ALC or AGMC retains a dedicated paragraph number to facilitate report usage. Figure 1.0-1 identifies the TO No. 1 CSR structure.

Background

MDMSC was awarded a contract to perform Technology Insertion-Engineering Services for the Air Force Logistics Command on 26 August 1988. A major segment of this contract was to perform Task Order No. 1 (TO No. 1) which is

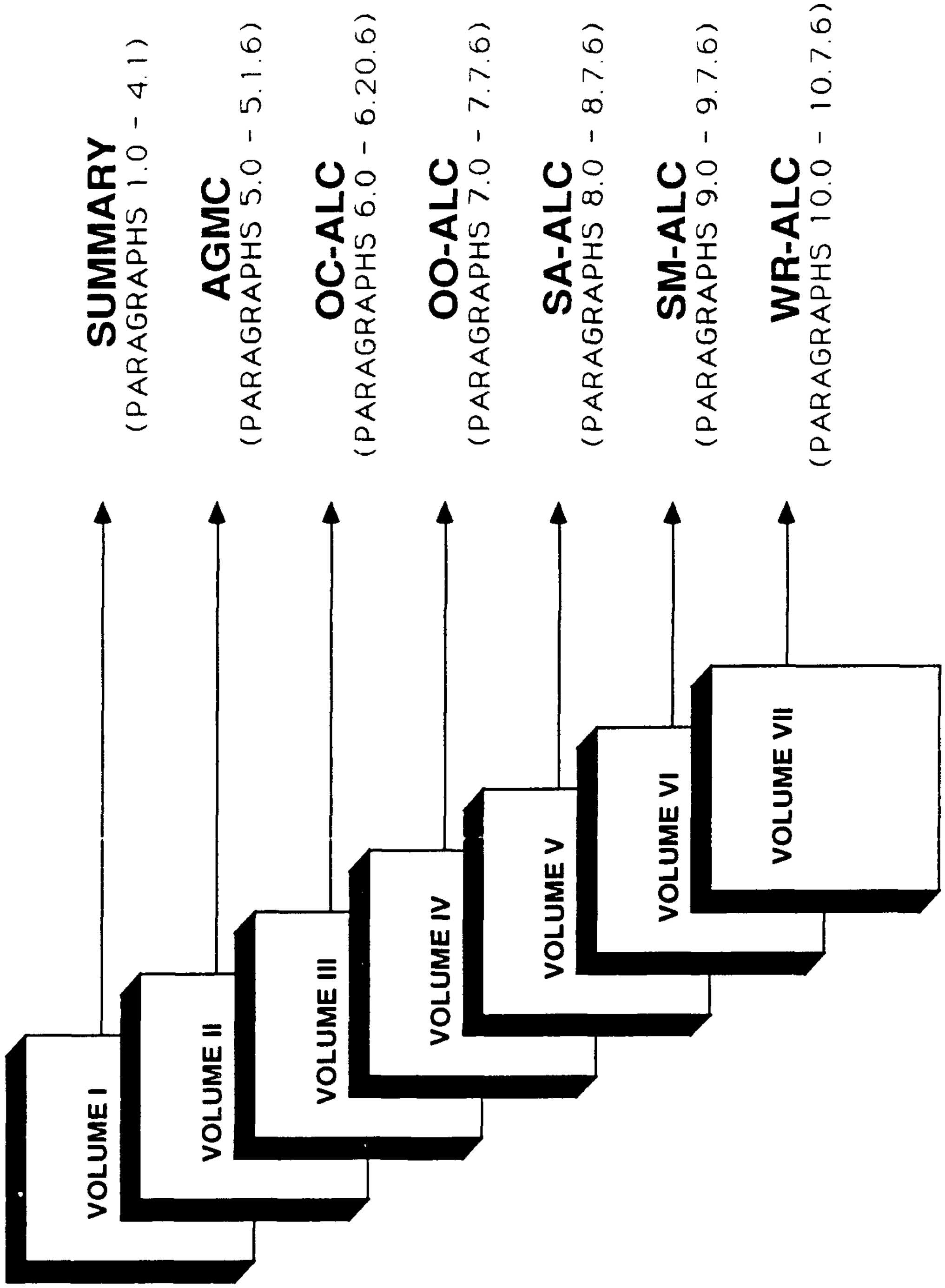
ALC/RCC BLOCK APPLICABILITY MATRIX

TABLE 1.0-1

	AGMC	OC-ALC	OO-ALC	SA-ALC	SM-ALC	WR-ALC
BLOCK 1	MAPBGA			MATPGB MATPSI MATPSS	MANPAB MANPAC MANPAD MANPAM MANPAN MANPAR	MANPGA MANPGB MANPGC MANPSA MANPSB MANPSC MANPSD
BLOCK 2		MABPAB MABPFF MATPAA MATPAB MATPAT MATPCA MATPCB MATPCC MATPCD MATPCM MATPFA MATPFE MATPFF		MABPSA MABPSB MABPSP		
BLOCK 3		MATPHA MATPHB MATPHE MATPIA MATPIM MATPIN MATPIW	MANPGP MANPGW MANPNA MANPRA MANPRB MANPRC MANPWW	MABPSC	MANRTB	

LSC 20276B

LSC-20382A



TASK ORDER NO. 1 CSR STRUCTURE
FIGURE 1.0-1

called Process Characterization. Process characterization involves the development of As-Is simulation models to provide a structured approach for defining current operations, for determining reasons for current success, and for identifying improvement areas. MDMSC performed process characterization at selected Resource Control Centers (RCCs) located at all five Air Logistics Centers (ALCs) and at the Aerospace Guidance and Metrology Center (AGMC).

The initial period of performance for TO No. 1 was for five months, with a completion date of 26 January 1989. However, due to cumulative problems encountered during performance of the contract, it became evident that the ambitious schedule could not be achieved.

On 11 January 1989, MDMSC requested an extension to the schedule. On 25 January 1989, the Air Force contracting office sent MDMSC a Cure Notice requesting an explanation as to why delivery will not be made on time, an acceptable plan for ensuring this problem will not recur, and a realistic delivery date. On 21 March 1989, MDMSC assigned a new Program Manager and TO No. 1 Manager. The TO No. 1 Manager title was changed to Manager, Process Characterization and his responsibility increased to also include the MDMSC Model Development and Simulation Group. Other lower level MDMSC personnel and location changes were also made during this reorganization. The final program replan and reorganization was completed and the program was restarted after a Technical Coordination Meeting with the Air Force Technology Insertion Program Manager and Working Group Members on 28 March 1989. The new program replan schedule divided the RCCs into three blocks for ease of control. Initial scheduled completion dates were 14 August, 11 September, and 25 September for Blocks I, II, and Final Report respectively. MDMSC requested a delay in the report for OC-ALC Block III RCCs to 23 October, and OO-ALC Block III RCCs to 15 December 1989.

Other actions initiated by MDMSC Program Management to ensure satisfactory program completion included providing for active participation of the workers in the program reorganization. This assured an opportunity for each individual to "buy-in" to his responsibilities and has assisted in ensuring the achievement of

their assigned tasks. Data documentation standards and engineering notebook standards were also developed and implemented in order to ensure compliance with requirements as well as to provide the user witr asy reference.

MDC top management is committed to the successful completion of this program. This commitment was demonstrated by a visit to Maj. Gen. (Sel.) J. M. Nowak, DCS/Maintenance, Mr. G. L. Mortensen, Asst. DCS and Col. C. A. Cunningham, Directorate of Logistics Contracting by Mr. J. P. Capellupo, President of MDMSC and Mr. R. Donnelly, Jr., MDMSC Program Manager on 22 May 1989. On 24 May 1989, Mr. J. F. McDonnell, MDC Chairman and CEO and Mr. R. Donnelly, Jr. met with Gen. A. G. Hansen, Commander AFLC to again endorse MDC's commitment to the successful completion of the Technology Insertion-Engineering Services Program.

Program Methodology

The UDOS model was originally developed by Southwest Research Institute (SwRI) in the UDOS 1.0 version and was provided to MDMSC by AFLC. MDMSC analyzed the UDOS program and detected a few limitations and developed a plan to eliminate these limitations. In addition, while consulting with each of the ALCs, a new set of specifications was developed which was deemed necessary to make UDOS applicable command wide, as well as make the program more applicable to a wide variety of RCCs. As data was gathered, while developing more knowledge of the RCCs at the ALCs, more enhancement requirements were discovered and incorporated into the model. A brief description of the enhancements and modifications which make up the present UDOS 2.0 version are as follows:

- Rewriting of Event Modeling

  During analysis of the program provided by the Air Force and developed by SwRI, MDMSC detected an interesting method of modeling events and releasing resources in UDOS. When a part was ready to seize resources, a piece of equipment, a certain number of a manpower skill, and a fixture, the model would scan for resource availability and determine if all required resources were available. If a resource, such as manpower, was not available, the part went into the manpower queue

and waited until the manpower was available. The model then checked to make sure all other required resources were available, seized the necessary resources, and scheduled the activity to be performed until one of the resources was no longer necessary. At that time, all resources; manpower, equipment, and fixtures were released. Then the model would attempt to regain the equipment and fixtures needed for further processing on the activity. If these resources were seized by a second part waiting in their queue before the first part would get them back, the first part would wait in the queue until the resources were again available. This process would continue until the part completes the entire activity.

This method of releasing all resources, and then attempting to regain some of those resources induced artificial queues which reduced the models ability to simulate a real process. Therefore, events for processing activities or tasks were rewritten so that when a resource is no longer needed for the activity, only that resource will be released. All other resources will be retained to continue the activity.

- Enhancements for Greater Flexibility
  - UDOS 1.0 allowed the modeler to specify only one piece of equipment, one manpower skill, and one fixture. While reviewing the operations of an RCC, it was determined that multiple manpower skills, fixtures, and equipment could be required for an operation. By redefining all of these as resources, the model now allows any number of resources, manpower skill levels, equipment, and fixtures.
  - Although multiple resources can be seized for an operation, in the event that a resource was not available, alternative resources can be seized. There is no limit to the number of alternative resources that can be specified for any resources defined.
  - Only one disassembly level was allowed in the original model. It was determined that a disassembled item could, itself, be disassembled into component parts. Therefore, the model now allows any level of nested disassemblies and assemblies.

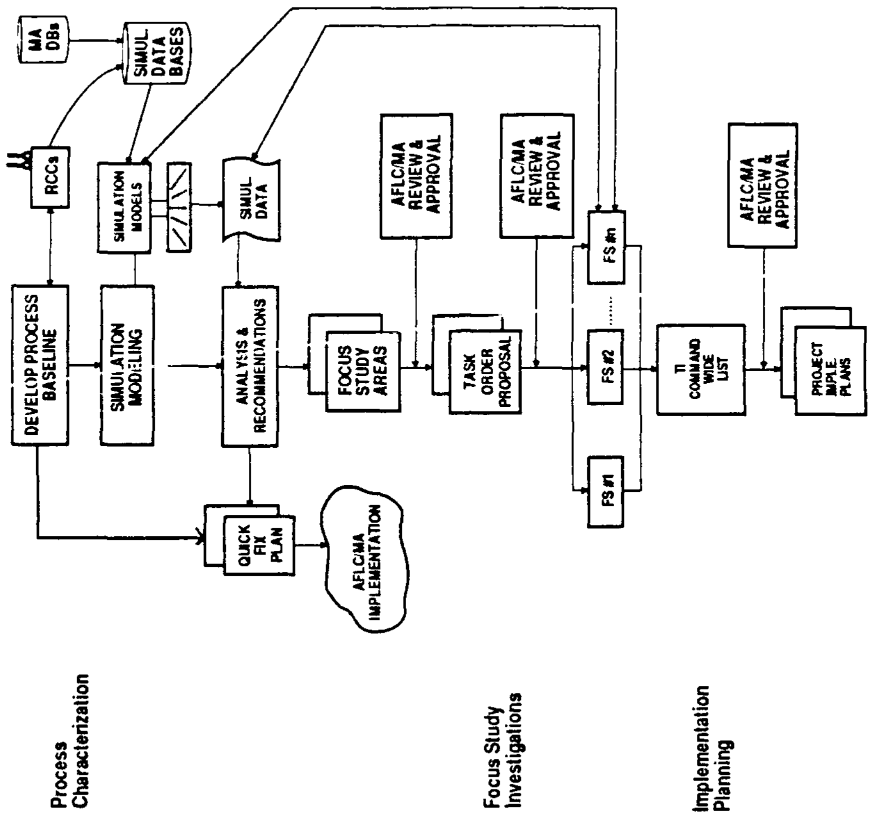
- UDOS 1.0 did not model calendar days, weekends, or holidays. The model was enhanced to account for these periods in which overtime can be performed as well as preventative maintenance can be performed.
- Once weekends and holidays were added, it was determined that, on occasion, maintenance would only be performed on specific shifts, therefore, UDOS was enhanced to allow the specification of a specific shift in which maintenance could be performed.
- UDOS 1.0 only allowed the analyst or modeler to specify one maintenance schedule. It was determined that there could be multiple maintenance cycles, such as a weekly cycle, monthly, quarterly, etc. Therefore, the model was enhanced to allow multiple schedules to be inputted.
- UDOS 1.0 allowed for an occurrence factor to be specified for an operation within a WCD, some WCD's were only performed when a percentage of parts did not pass a specific test. UDOS 2.0 allows for an occurrence factor for the entire WCD. If this factor was less than 1.0, then some percentage of the parts inducted would bypass this particular WCD.
- If there is a specific limitation of parts within a specific RCC, then the upper limit of the work in process can be specified. This will allow the model to limit the number of parts that can be inducted at any one time.
- An option has been incorporated, that will allow the analyst to specify how equipment will be released in the model. If the option is turned on, then a part will retain the resources until resource changes are necessary. If the option is turned off, then the resources are released after each operation is completed. If the first option is picked, then queues will only occur when resource changes are required while the second option will allow queues at each operation.
- UDOS 1.0 provided output reports, but it was found that added reports and reformatting was required to make the model easier to validate and utilize.

- The error checking routines in the model were not adequate for mass production of RCCs. Therefore, an extensive set of data error checking pre-processors was developed to enhance the data checking and ensure that the model input data was in a state necessary to execute the program.

The technical approach utilized in the Technology Insertion Program is shown in Figure 1.0-2. The process used in process characterization and subsequent data documentation on Task Order No. 1 is shown in Figure 1.0-3. Major elements of the process are identified below:

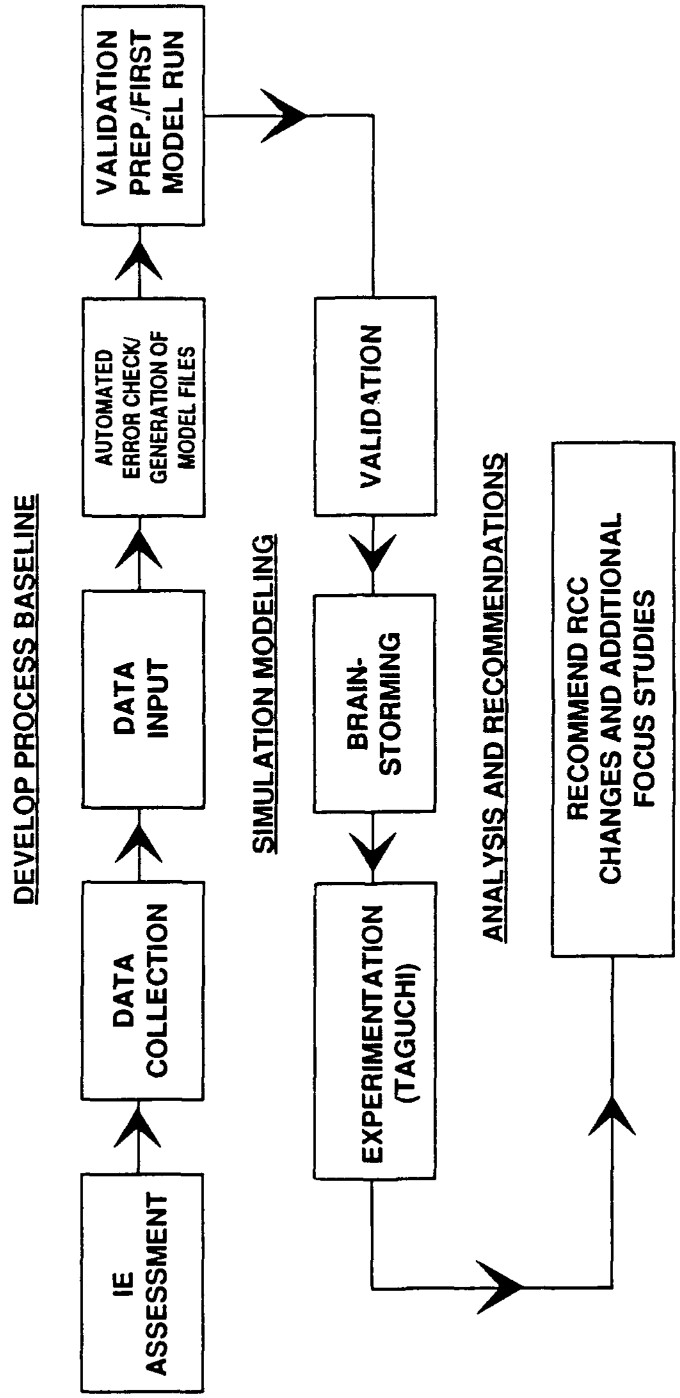
- Industrial Engineering Assessment - MDMSC engineers study the processes used in the RCC, evaluate manpower, equipment, facilities, product flow, etc. This information is used to develop "quick fix" recommendations that can improve RCC operations with minimal capital investment and develop "focus study" recommendations that promise significant improvements, but require more detailed study.
- Data Collection - MDMSC engineers collect data which is used to characterize the RCC. This data includes operation times, equipment availability, part flow times and historical data where available. Figure 1.0-4 depicts a typical UDOS 2.0 data bank.
- Data Input - The process of inputting data involves taking profile and history data and key punching on site. Data disks are mailed to St. Louis where the data is passed through an automated error checking program on a PC. After an error-free pass is made, it is loaded onto the VAX computer as a set of model "flat" files.
- Validation Preparation - Once the flat files have passed the automated error check and been loaded into the VAX, the model can be run for the first time. The output of this run is subjected to a manual error check by MDMSC engineers and simulation experts. Flaws in the flat files are corrected prior to validation. Once the manual check is passed, the model is ready for validation.

LSC-20381C



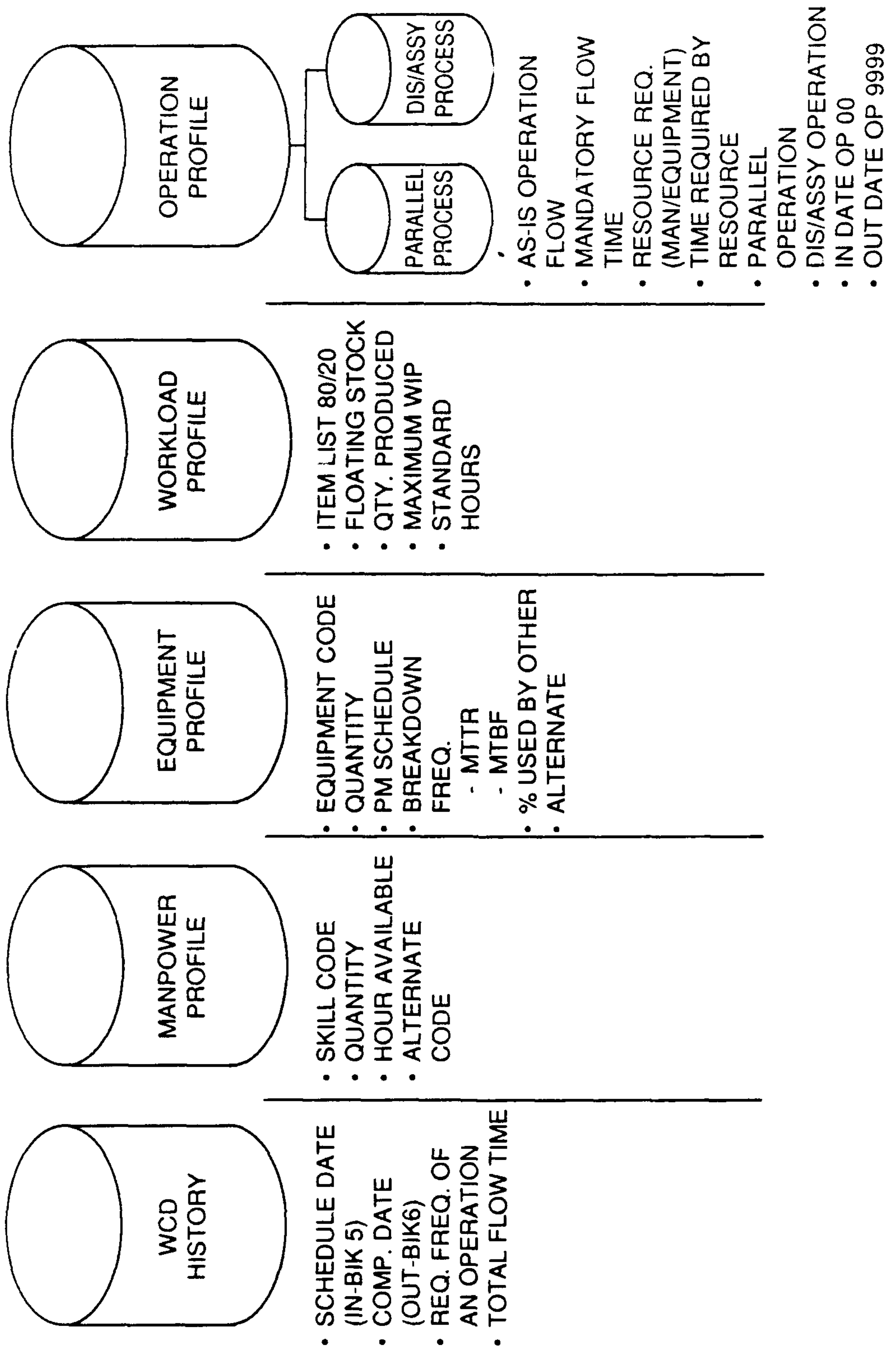
TECHNICAL APPROACH OVERVIEW
FIGURE 1.0-2

THE PROCESS



RCC CHARACTERIZATION
FIGURE 1.0-3

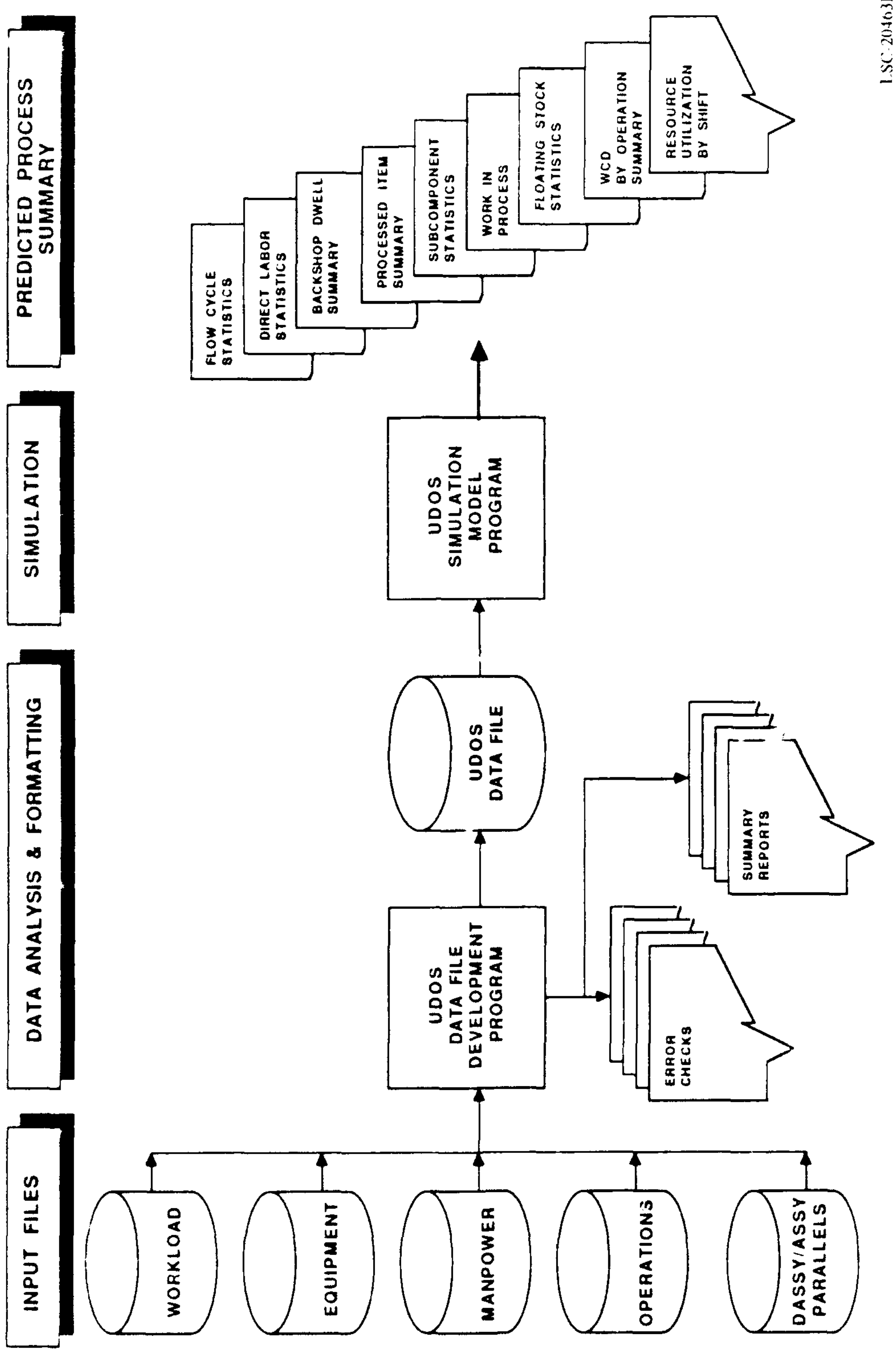
LSC-20380B



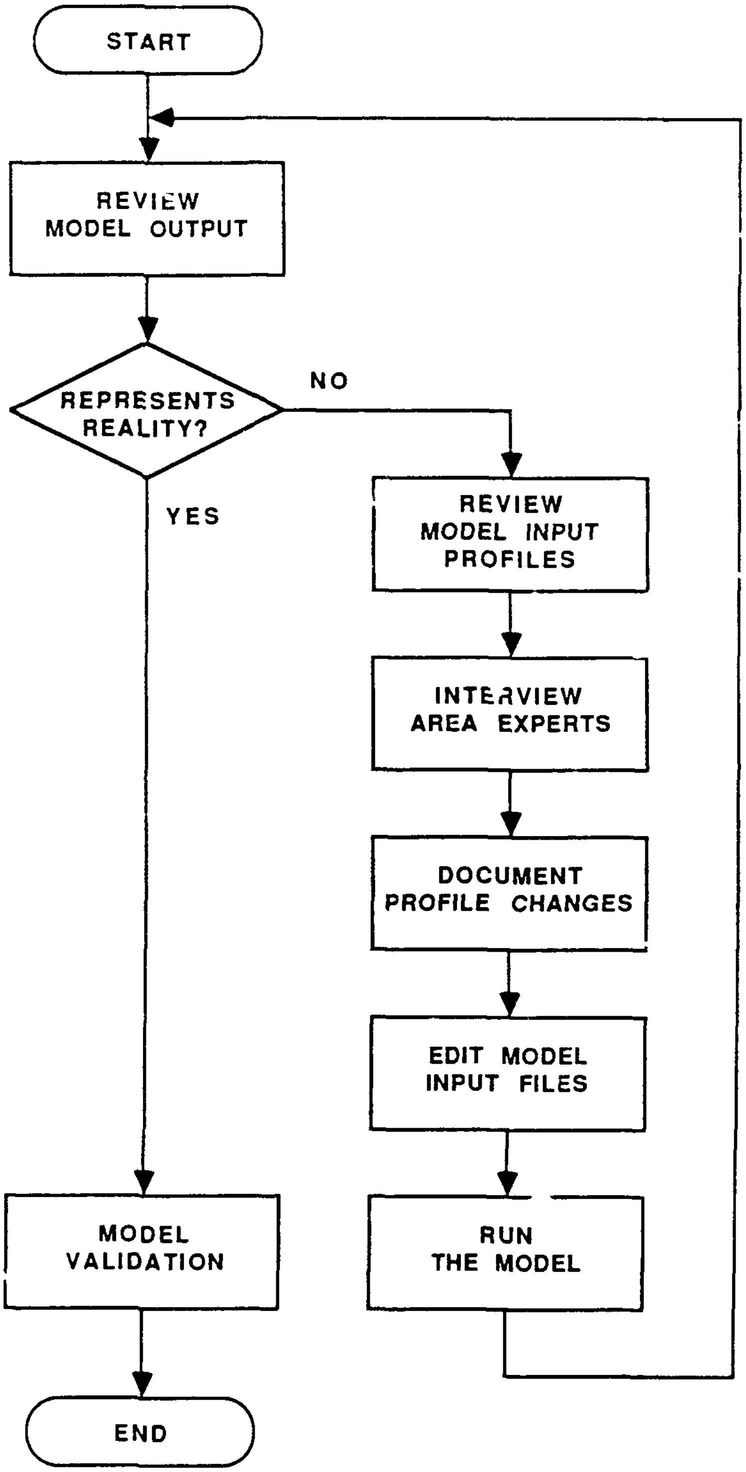
LSC-20198D

TI DATA BANK/SIMULATION MODEL
FIGURE 1.0-4

- Model Validation - Validation is performed at the RCC and recommended for acceptance by RCC validation team. The model is an approximation of the As-Is condition captured at the time of interview and is intended as a tool for engineering assessment of shop operations. The model provides an approximation of reality, establishes a baseline for experimentation, and provides a useful tool for exploring the effect of change without disruption of operation. Since the model is only an approximation of reality, the validation team must take into consideration abstractions from the real case. These assumptions include items such as: Only a percentage of the workload is modeled; budgetary impacts; workload variation; rework not modeled; lack of unscheduled overtime; problems concerning data gathering. Criteria used for model validation include a comparison of simulated throughput vs. available production data, simulated flow days vs. best available RCC flow days and a comparison of simulated resource utilization vs ALC/RCC assessment. Final acceptance is based on the validation team concurrence that the model objectives were met based on agreed assumptions. Figure 1.0-5 depicts a fractional diagram of UDOS 2.0. Figure 1.0-6 shows the basic validation process that was utilized.
- Brainstorming - ALC personnel, assisted by an MDMSC engineer, develop a list of questions for the model to answer. Figures 1.0-7 and 1.0-8 show examples of the brainstorming process.
- Experimentation - Ideas generated during the brainstorming session are used to set up an experimental design which is then used with the model to generate simulation runs. Data obtained is evaluated with site personnel. Experiment results are used to document recommendations for RCC improvements. Experiments are performed using a Taguchi orthogonal array. The Taguchi methodology permits making a reduced number of runs using an orthogonal array set-up. The data obtained from these runs is of improved quality compared to a similar number of runs not using the orthogonal array. The Taguchi methodology also provides model interactions among the changes as well as the changes themselves. Results obtained produce an improved combination of equipment, manpower and processes to minimize flow time and



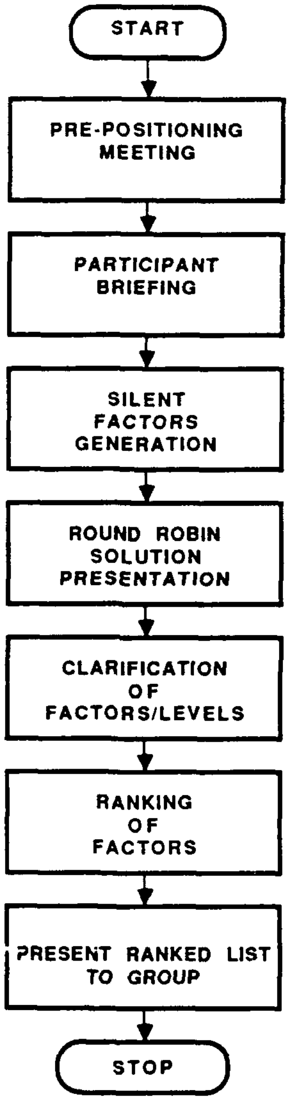
UNIVERSAL DEPOT OVERHAUL SIMULATOR (UDOS 2.0) FUNCTIONAL FLOW DIAGRAM
FIGURE 1.0-5



LSC-20456B

BASIC MODEL VALIDATION PROCESS

FIGURE 1.0-6

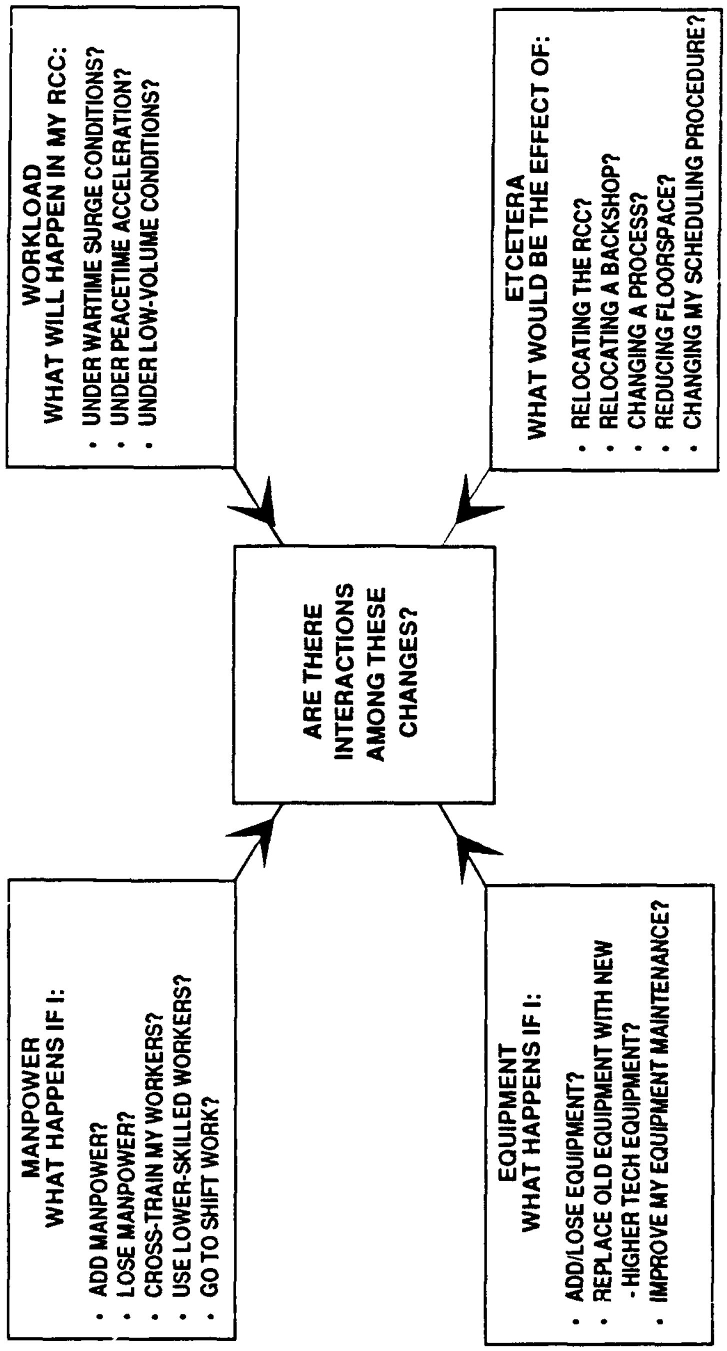


LSC-20462B

TI-ES BRAINSTORMING PROCESS

FIGURE 1.0-7

ALC PERSONNEL, ASSISTED BY A MDMSC ENGINEER,
DEVELOP A LIST OF QUESTIONS FOR THE MODEL TO ANSWER



BRAINSTORMING
FIGURE 1.0-8

LSC-20379B

maximize RCC throughput. Experimentation can project the result of changes without capital investment and helps determine the value of cost saving ideas where "hard" numbers are unavailable. It also gives the ALCs a powerful tool for planning for the future including wartime conditions and demonstrates the potential value of proposed focus studies.The results of the characterization process provide quick fix suggestions that can be implemented to defray the cost of the program. In addition, the ALCs and AFLC HQ can select those focus studies that they want performed as part of future task order proposals. The model and respective data files are delivered to the ALCs for further in-house experimentation.

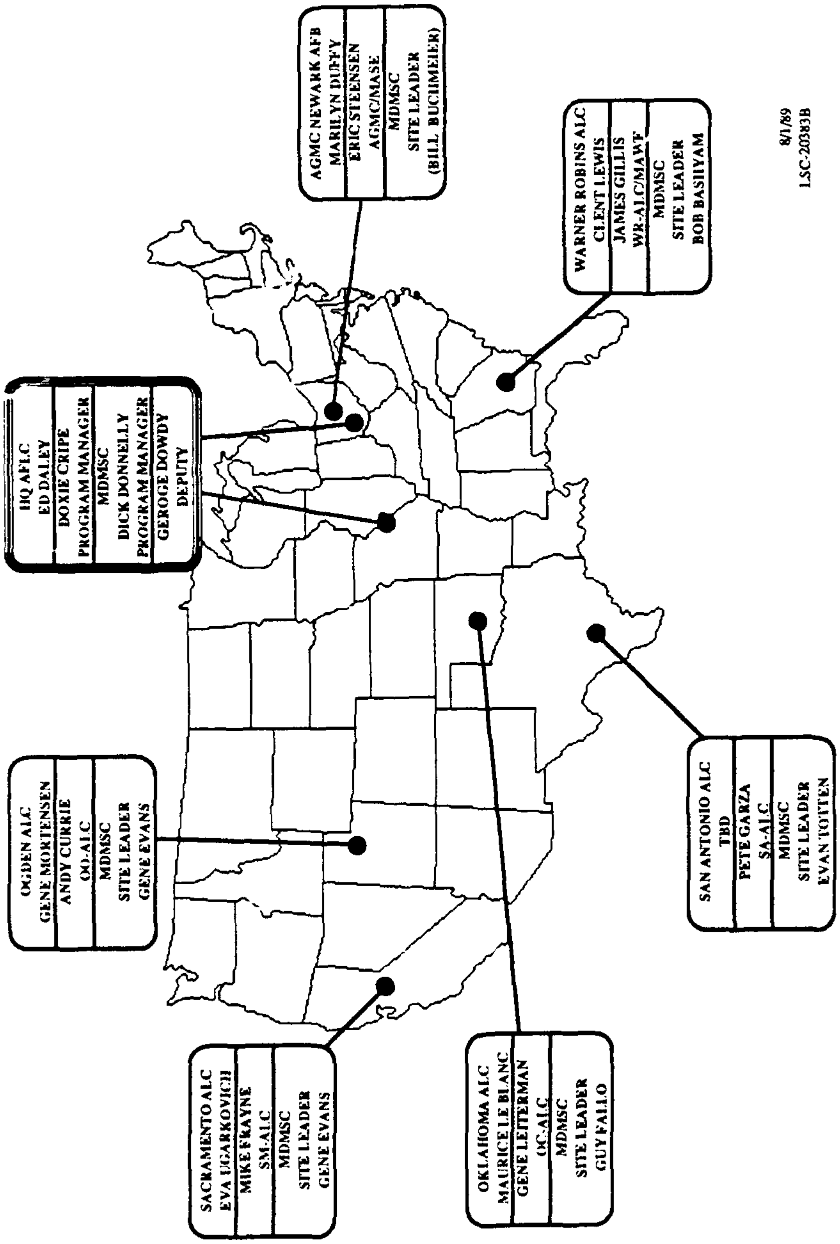
Technology Insertion Team Leaders

The Technology Insertion approach to organization has been to develop AFLC/MDMSC teams at each of the five Air Logistics Centers and the Aerospace Guidance and Metrology Center. Teams at each location consist of an AFLC Working Group member, and an MDMSC Site Leader or Program Manager. This team approach has proven to be very beneficial and very important in removing potential communication barriers. Figure 1.0-9 identifies these team members by location.

Results

An annual budget savings of $12.0 million occurs from the implementation of the recommended Block I, II, and III (excluding OO-ALC) quick fixes and focus study improvements. In addition, over $24M can potentially be saved by cost avoidance due to reductions in work in process inventory. These savings are shown in Table 1.0-2 and represent an overall 4.2% reduction in the current yearly operating cost for the RCCs addressed.

The total investment cost of the Block I, II, and III (excluding OO-ALC) recommendations is estimated at $8.2 million. This cost includes the focus study costs ($4.0 million), the cost to implement the quick fixes ($0.7 million) and the cost to implement the focus study recommendations ($3.5 million).



TECHNOLOGY INSERTION TEAM LEADERS
FIGURE 1.0-9

AFTI COST SAVINGS ($FY89, THOUSANDS)
TABLE 1.0-2 (SHEET 1 OF 2)

ALC	RCC	CURRENT ANNUAL OPERATING COSTS	ANNUAL BUDGET SAVINGS			% ANNUAL SAVINGS	INVESTMENT COST			NPV OF TOTAL CASH FLOW (5 YR. SAVINGS - INVESTMENT)
			QUICK FIX	FOCUS STUDY	TOTAL		QUICK FIX	FOCUS STUDY	TOTAL	
AGMC	MAPBGA (1)	$4,663	$50	$314	$364	7.8%	$10	$506	$516	$874
SA-ALC	MABPSA MABPSB MABPSC MABPSP MATPGB MATPSI MATPSS	$71,723	$84	$526	$610	.9%	$38	$1,230	$1,268	$1,743
SM-ALC	MANPAB MANPAC MANPAD MANPAM MANPAN MANPAR MANRTB	$16,874	$892	N/A	$892	5.3%	$315	$380	$695	$3,834
WR-ALC	MANPGA MANPGB (1) MANPGC MANPSA MANPSB MANPSC MANPSD	$46,356	$3,678	$2,711	$6,389	13.8%	$257	$3,222	$3,479	$21,422

NOTES: (1) AGMC FSR #1 AND #2 INCLUDED IMPLEMENTING RECOMMENDATIONS AT BOTH AGMC MAPBGA AND WR-ALC MANPGB RCCS

LSC-20384D

AFTI COST SAVINGS ($FY89, THOUSANDS)
TABLE 1.0-2 (SHEET 2 OF 2)

ALC	RCC	CURRENT ANNUAL OPERATING COSTS	ANNUAL BUDGET SAVINGS			% ANNUAL SAVINGS	INVESTMENT COST			NPV OF TOTAL CASH FLOW (5 YR. SAVINGS - INVESTMENT)
			QUICK FIX	FOCUS STUDY	TOTAL		QUICK FIX	FOCUS STUDY	TOTAL	
OC-ALC	MABPFF MABPAB MATPAA MATPAB MATPAT MATPCA MATPCB MATPCC MATPCD MATPCM MATPFA MATPFE MATPFF MATPHA MATPHB MATPHE MATPIA MATPIM MATPIN MATPIW	$147,653	$2,079	$1,705	$3,784	2.6%	$72	$2,175	$2,247	$12,429
TOTAL		$287,269	$6,783	$5,256	$12,039	4.2%	$692	$7,513	$8,205	$40,302

LSC-20384D

The Net Present Value (NPV) of the total cash flow of the investment costs and five year savings is estimated at $40.3 million. This NPV equates to $27.5 million from implementing the quick fixes and $12.8 million from focus study recommendations. These costs represent the net savings (five year savings - investment costs) to the Air Force. The NPV uses constant FY89 dollars and a quarterly discounting factor equivalent to 10% yearly, and is in compliance with Air Force Regulation (AFR) 173-15, Cost Analysis Procedures, dated 4 Mar 88.

2.0 PROGRAM ASSESSMENT

The following is an outline of suggested topics to be included in the Program Assessment, paragraph 2.0. This section will not be finalized until completion of the Task Order No. 1 effort. Submittal of the Volume I Summary will occur by December 15, 1989.

- Strengths/Successes
- Lessons Learned
- Enhancements to Methodology

3.0 AFLC ASSESSMENT

The mission of AFLC, as stated in the FY 88 Depot Maintenance Annual Report, is to keep the U. S. Air Force Aerospace Weapons Systems and Support Equipment in a constant state of readiness and to provide quality components to customers, in a timely manner at the lowest possible cost. As anticipated, the 42 Resource Control Centers (RCCs) addressed in this CSR are fulfilling their mission of keeping the Air Force Aerospace Weapons System and Support Equipment in a constant state of readiness.

They are not, however, doing so at the lowest possible cost. In Task Order No. 1 alone, MDMSC has identified over $40 million in potential savings, and has barely scratched the surface of cost savings possibilities. While the Technology Insertion methodology used by MDMSC to identify these savings is a powerful tool, with broad applicability, it is not the only source of improvements. After assessing RCCs across the command, MDMSC has arrived at an important conclusion: A major source of inefficiencies and high costs is not an inappropriate distribution of technology. Our assessment identifies the current mindset as a major source. This mindset is the tradition-bound "business as usual" attitude that has already cost many segments of American business their leadership positions and threatens many more. Many commercial businesses in this country have abandoned this mindset for a more flexible and risk-oriented attitude with positive results. The impetus for this switch, however, was relentless competitive pressure from off shore industries. No such known competition exists for AFLC, and the results are visible in many levels of management.

We have observed that the current "system" at the ALCs discourages management personnel from spending time on the shop floor. The manufacturing and management revolution taking place in this country strongly suggests that management levels be reduced and that remaining management personnel need to be visible and available to support production personnel.

The production workers demonstrate great skill, job knowledge and often, a real desire to produce a quality product. They are prevented from producing to their full potential by a system that has stifled creativity and tolerated mediocrity.

The concept of what "should be" is well-detailed in the DoD philosophy of Total Quality Management (TQM) and doesn't need repeating here. There are some steps which AFLC managers can take, however, that will move the command closer to real cost effectiveness (and TQM).

The AFLC assessment may be broken into three areas: Technology/Process Management, Data Collection/Management, and Cost Consciousness.

3.1 TECHNOLOGY/PROCESS MANAGEMENT

The processes used by the AFLC to produce its products are enormously complex, due largely to the nature of repair/remanufacturing. Repair/remanufacturing involves many variables and requires much more decision making than manufacturing/assembly. Statistical variances within the process are much harder to control in the repair environment because the raw materials (end items to repair) are inducted in varying states of need. These variances complicate the decision making process, necessitating a greater level of production floor technological skill than in the manufacturing environment. The variances in the repair process also create the need for very flexible, quick to respond, support systems such as supply and engineering.

Each ALC has the basic essentials to perform these tasks. The work force is characterized by enormous experience and substantial training accumulated over the years. The average ALC worker is more experienced and better trained than his commercial counterpart. Unlike their commercial counterpart, however, the ALC worker may find it more difficult to make a significant improvement in the way he/she does his/her job. They are limited by an organizational structure that does not fully utilize the value of their experience and isolates them from the management of the production process.

The organizational structure of the ALCs resembles an old form of bureaucracy rather than a modern, production-oriented business. Responsibility and authority are disconnected and lines of communications snarled. No one person or office has control over the complete production process, making innovation and commitment difficult.

The best example of this situation is in the relationship between the directorates MA and MM. MA has responsibility for meeting production quotas, but does not control the processes they use to meet these quotas. MM's engineers do control the production processes, but have no responsibility for the results. When a production manager in MA wants to change a repair process, he has to ask an MM engineer for approval. If the engineer approves the change he assumes responsibility (risk) for the results, but gains no advantages (the results weren't his problem in the first place). If he disapproves the change, he avoids risk and suffers no consequences. Many MA production managers have become hesitant to seek changes in existing processes.

MA's "customer" is MM, with whom they negotiate annual workloads. This leaves MA ignorant of the real customers' (the combat commands) needs/plans, and MM ignorant of MA's real production capacity. The requirement for each organization to defend its "turf" stifles continuous improvement. As a result, much of the skill and experience of the work force and their supervisors is not used to the fullest extent. In fact, under the current structure, this high level of skill and experience can cause more harm than good. Personnel who are well versed in their jobs, and encouraged to make production quotas at all costs, will show surprising inventiveness in achieving this goal. However, this ability to continue production under adverse conditions can create a feeling of false well-being in the minds of upper management. Management at this level, given the complexities of their own jobs, may tend to lose track of operations occurring at the floor levels.

A good example of this is the constant problem of supply. Every worker and supervisor interviewed by MDMSC complained of problems getting replacement parts or the poor quality of the parts when they did arrive. AFLC management

at all levels appears to be willing to acknowledge the situation, yet no one knows how bad it really is. The reason is obvious. The command is meeting its mission of repairing weapon-systems and no one is willing to "fix it if it ain't broke." In fact, the supply system appears to be broken, but it's glued together with a mixture of worker dedication and huge amounts of money.

When a part/material shortage occurs, the production personnel demonstrate technical expertise, creativity and a "can do" attitude in developing work arounds to address the problem. In some cases parts/materials are available through unauthorized inventories. The unauthorized inventories are accumulated on the production floor by over ordering on previous workloads or by unauthorized manufacture of spare parts. In other instances, work arounds are developed by reclaiming used parts which would normally be scrapped, thus building a "hidden factory." At times, the parts shortage issue must be addressed by inducting additional end items into the repair system so parts may be robbed from these inductions to complete end items awaiting parts for completion. This creates enormously expensive in-process inventories, and denies management any real visibility into the problem. The work force is doing its best under a flawed system, but management is losing the feedback it needs to solve problems.

A better organizational structure would be one used by many product-oriented companies (including MDMSC), where the manager responsible for producing the product controls everything needed to do so. The program manager for a given product would control the engineering, planning, scheduling, administration, and procurement functions, as well as the actual production resources needed to produce that product. This person would work directly for his customer and be responsible for his own budgeting, staffing, and cost/data collection. Where the use of a common piece of capital equipment (including facilities) or staff agency was unavoidable, this manager would be responsible for negotiating the required amount of support with other users. Individual production managers could actually compete among themselves for new business.

This structure would eliminate the disconnect between responsibility, authority, and accountability, encourage improved communications and integration of activities, and discourage the formation of functional staff "empires." It would also greatly enhance the effectiveness of the TI methodology. Those improvements in processes and technologies identified by the TI team would be easier to implement and could show results far more quickly than under the current structure.

3.2 DATA COLLECTION/MANAGEMENT

During Task Order No. 1, the largest problem encountered was the collection of accurate data. Accurate data is not only critical to the TI effort, but is essential to effective management. Peter Drucker expresses this need by saying:

> You cannot manage what you cannot measure,
> You cannot measure what you cannot define,
> You cannot define what you don't understand.

The command has impressive automated data collection systems in place that generate numerous reports and statistics. The ALCs collect enormous quantities of data, to feed these systems. It is recognized that data systems management of this magnitude is a monumental task. Integration of data systems and analysis of this information is a vital tool for proper management. The ALCs, however, have severe problems in the type of data collected and the value attached to it.

In the book "The Goal," the author warns of the use of complex artificial measurements such as "loading" or "efficiency" or various other numbers that don't describe the value of the product produced or the cost to produce it. The data systems of AFLC, however, abound with these kinds of numbers. For example: AFLC uses direct product standard hours as a measurement tool. DPSH is defined as the time determined necessary for a qualified worker, working at a pace ordinarily used, under capable supervision, experiencing normal fatigue and delays with the standard use of existing resources to do a defined amount of work of specified quality when following a prescribed method (AFLCP 173-10, 30 May 1986). DPSH is used to determine such things as

workload, forecasting manpower requirements, surge capability, and cost of end item repair. Less than 40% of DPSH used are engineered standards. This leads to inherent inaccuracies in the system. Direct Product Actual Hours (DPAH) rate is derived by applying the efficiency rate to DPSH (AFLCP 173-10, 30 May 1986). DPAH is therefore a calculated value rather than an actual value, in spite of its name. Its use as a management tool is suspect at best.

Actual hours required for repair of an end item (flow time) are not currently tracked at the operation level. This information is necessary for identification of areas of potential improvement and measurement of the effectiveness of management controls. The Technology Insertion team attempted to use date stamps from Work Control Documents (WCDs) to determine if the simulation modeling effort accurately approximated the repair process, but the WCDs were not originally intended for this purpose and proved to be of marginal use for that application. No other source of actual flow times could be found. This means that, in many cases, no one knows how long some repairs really take.

MDMSC recommends that a system to track actual flow time of repair of end items to the operation level be developed for use on the production floor. This system should include daily reporting of statistics and status to the production floor. It has been recognized by industry that "you get what you measure." If production personnel are made aware of how they are doing, they will naturally develop an interest and focus efforts on improvement. This concept is basic to Statistical Process Control. The data collected should be "how long did it really take to do this job," not "how long should it take..." or "how long was it planned/estimated to take...." The results of this system should be available to everyone in the production organization.

Other areas of data collection are equally in need of revamping: Up to date layout drawings of the ALC facilities were not available in many cases. Process flow diagrams were not available for many of the repair processes. These would aid engineering planning and production in defining and improving operations. The equipment maintenance and repair data system (G017) does not contain enough information to determine mean time between failures, mean

time to repair, cost of repairs, and details on types of failures. This information is vital in making sound determinations of actual equipment capability and cost effectiveness. Documentation of temporary and manufacturing workloads was marginal at best.

Very little data is available on scrap rates, rework, and returns from the customer for quality problems. This data is vital in developing First Time Quality evaluations. Again, "you get what you measure."

If a workable data collection system were put in place, using the automated systems that currently exist, the effectiveness of TI methodology would be greatly enhanced. As the quality of the available process data improves, so will the quality and utility of the simulation models produced under this program. The better the data in the model, the better the improvement recommendations that model can help generate.

3.3 COST CONSCIOUSNESS

The mindset of "meet production quotas at any cost" has led to a situation where production quotas are met at unnecessarily high costs. For example, some RCCs are willing to tolerate levels of inventory that would bankrupt a commercial business because these inventories help "get the parts out the door", but little attempt is made to learn why such costly stocks are required. The reason appears to be that the importance of inventory costs is not emphasized.

The strongest indicator of this trend is the current lack of usable cost data. While some cost data is available through accounting at a high level (frequently budget rather than cost data), virtually no usable cost data is obtainable on the shop floor. As a result, workers and supervisors are unable to identify cost saving opportunities because they don't know the cost of the current method, much less that of the improved. Such data as average annual maintenance costs on machinery, cost of facilities, maintenance/operation, rejection/scrap rates for parts, consumption rates for consumables (tools, fluids, etc.), labor

hours per operation, value of inventory, and material cost per part were virtually impossible to obtain during process characterization.

In place of this vital cost data, TI team was given a variety of non-engineered standards and budgetary estimates. Parkinson's first law warns that expenditures rise to meet budgets, making such soft "budgetary" numbers dangerous yardsticks for cost management. Collecting and disseminating real cost figures is always expensive, but the cost of not doing so is many times more exorbitant.

When MDMSC engineers point out a practice that commercial industry would consider unjustifiable, the tendency is often for ALC managers to state that the mission of the ALC is so important to national defense that it must be performed at any cost. In an era of declining defense budgets and increasing use/retention of older, more repair-intensive weapons, this attitude is difficult to afford. Certainly the mission must be accomplished, but costs must be reduced as well.

3.4 CURRENT STRENGTHS AND FUTURE GROWTH

Although this report identifies many areas for improvement with respect to AFLC operations, the suggested changes to existing systems should not be viewed as criticism but as opportunities for improvement. The RCCs characterized showed admirable strengths in many ways. In the end analysis, it is only by building upon these inherent strengths that improvement of any facet of production ability in an industrial setting is realized.

In performing process characterization at the various ALC bases, it was observed that areas of state of the art technology existed beside shops dedicated to obsolete, labor-intensive repair processes. Areas containing large, sophisticated Numerically Controlled machines were in contrast to an adjoining RCC where the hand forming and trimming of sheet metal occurs. Automated Non Destructive Inspection (NDI) lines are seen in the same building where personnel use inspection mirrors and flashlights to search for hidden debris and damage in aircraft structures. In may cases, where the TI team has recommended new technologies, the supervisors and engineers in the RCC

were already aware of the technology but lacked the appropriate data to "sell" the idea to upper management.

Data collection itself had islands of real quality. The scheduling operation in MATPIM at OC-ALC, for example, collected detailed historical data on manufacturing jobs. This data included actual induction and sell dates, batch sizes, processes used, and prints and drawings used, as well as, comments on supply difficulties encountered. This volume of data made modeling of the manufacturing operation easy and highly reliable. Scheduling operations in other RCCs in the same ALC had virtually no actual data whatsoever.

The command has all the "grass roots" resources it needs to succeed, if management can assist in the way improvements are currently handled. The engineers, planners, and schedulers in AFLC are as talented as those in commercial industry but are isolated from processes they support. The TI team feels that these support people should be out on the shop floor, reporting to the RCC managers and tasked with process improvement. The islands of excellence occur when someone becomes sufficiently involved with the process and sufficiently motivated to improve it. To achieve excellence across the command everyone must be so involved and motivated.

The command has already made real progress in this area with their Quality, People, Product, Performance, Process (QP4) program. If the command is able to continue this progress, many of the problems identified in this report will be solved as a matter of course. This program (very similar to the Total Quality Management System currently used in MDMSC) is designed to push responsibility and authority for control of each element in QP4 to the lowest possible level in the organization. It is absolutely vital that AFLC and ALC managements be intimately involved with this program if it is to succeed. Each level of management must demand that the one below take responsibility for recommending improvements. It is not enough to praise improvements as success stories. Managers should also concentrate on areas that have not shown improvement, asking; "what can I do to help you improve today?"

While managers must expect their subordinates to constantly generate suggestions for improvement, they should never punish ideas that fail or allow subordinates to hide problems (especially in Quality). The only failures are those who will not take risks or attempt to improve. Managers must also expect most improvements to require their, or their boss', action. Deming's basic research advises that 85% of all problems can only be fixed by management. For each success, however, there are still many failures. Management can never afford to assume "the program is working" but must refuse to accept anything less than success from each subordinate level. Keep the pressure on for improvement, forgive honest mistakes, and never except anything less than 100% quality work.

As more process improvements are generated, the TI team's technology transfer responsibilities will become increasingly critical. A mushrooming volume of process changes will require the TI team and AFLC management to devote more efforts toward standardizing these processes and keeping the cross-command lines of communication open.

It is MDMSC's conclusion that, through organizational and attitudinal changes recommended in this report, AFLC can rapidly become a world-class aerospace depot in the near term. The TI methodology used in this program is an important tool in this effort, and like the repair processes it studies, must be constantly improved. It is important for AFLC and MDMSC technical and managerial staffs to allow themselves maximum flexibility in the application of current TI methods and be willing to jointly accept the risks of trying new methods.

4.0 SUMMARY OF ALC PROCESS CHARACTERIZATION RESULTS

The following paragraphs highlight the improvement opportunities recorded by MDMSC during process characterization for AGMC and the five ALCs. These improvement opportunities are documented as part of the engineering assessment for each center. In addition to the description of each quick fix or focus study recommendation, an estimate of annual budget savings is presented. Type of impact, cost avoidance, and investment costs are also provided in accompanying tables to broaden understanding of the issues addressed.

Some recommendations pertaining to health and safety improvements have no dollar savings ascribed, but are included for their own intrinsic values. Also, some recommendations pertain to more than one RCC and are so noted in both tables and text. Estimated savings are aggregated in these cases.

Most of the focus study and quick fix recommendations are supported by the UDOS 2.0 simulation model characterization. Some, however, have attributes which do not lend themselves to model experimentation. Nonetheless, the ALC/MDMSC teams felt that these recommendations should be included in this report.

More detailed discussion of engineering assessment and the results of process characterization, are provided in the following Contract Summary Report (CSR) and corresponding Quick Fix Plan (QFP) paragraphs:

Center	Volume	CSR Paragraph	QFP Paragraph	Vol I Paragraph
• AGMC	II	5	2	4.1
• OC-ALC	III	6	6	4.2
• OO-ALC	IV	7	7	4.3
• SA-ALC	V	8	8	4.4
• SM-ALC	VI	9	9	4.5
• WR-ALC	VII	10	10	4.6

4.0.1 Quick Fix and Focus Study Applicability

This section will address the command wide applicability of appropriate quick fixes and focus studies.

MDMSC has ranked the focus study recommendations for those centers which have more than one recommendation. Both the focus study team and program management participated in these rankings. MDMSC recommended rankings for ALC review and concurrence are provided in Tables 4.0-1 through 4.0-14.

Table 4.0-15 represents both the command wide applicability of all focus study recommendations and the estimated annual cost savings. This matrix will continue to change through submittal of the final report. The two focus study recommendations suggested for AGMC also have applicability at WR-ALC. MDMSC is confident that both centers will benefit from these recommendations primarily because both operations are similar in the processes they perform. MDMSC also had the opportunity to assess each operation before making a recommendation that would effect both.

Tables for all quick fixes, prioritized by size of estimated annual budget savings, are presented in the following subparagraphs for each ALC respectively. MDMSC estimates the implementation cost for those quick fixes identified for AGMC to be 20% of the annual savings. MDMSC has estimated the implementation cost for all other quick fixes identified. An NPV of $27.5 million is calculated by discounting the investment cost over four months then analyzing five years of savings.

Total NPV five year savings for Block I, II and III (excluding OO-ALC) for both focus study recommendations and quick fixes is $40.3 million.

WEIGHTED RATING CALCULATION

TABLE 4.0-1

CENTER: AGMC

FOCUS STUDY RECOMMENDATION: IMPROVE UTILIZATION OF GYRO AUTOMATIC TEST EQUIPMENT

ATTRIBUTE	ASSESSMENT OF IMPACT (1)	AFLC/MA WEIGHTING FACTOR(2)	WEIGHTED RATING (1) X (2)
SCHEDULE	1 2 3 4 5	1 3 5 7	20
COST	1 2 3 4 5	1 3 5 7	35
IMPLEMENT RISK	1 2 3 4 5	1 3 5 7	15
SURGE	1 2 3 4 5	1 3 5 7	25
CROSS CMND. APPLICATION	1 2 3 4 5	1 3 5 7	28
SAFETY	1 2 3 4 5	1 3 5 7	35
ENVIRONMENTAL HAZARDS	1 2 3 4 5	1 3 5 7	35
TRAINING	1 2 3 4 5	1 3 5 7	14
MAXIMUM SCORE = 280			TOTAL 207

ASSESSMENT OF IMPACT: HIGHEST NUMBER HAS GREATEST BENEFIT OR LEAST AMOUNT OF IMPACT

WEIGHTING FACTOR: HIGHEST NUMBER HAS HIGHEST PRIORITY

LSC-20377F

WEIGHTED RATING CALCULATION

TABLE 4.0-2

CENTER: AGMC

FOCUS STUDY RECOMMENDATION: IMPROVE REPAIR PROCESS OF GYROS

ATTRIBUTE	ASSESSMENT OF IMPACT (1)	AFLC/MA WEIGHTING FACTOR(2)	WEIGHTED RATING (1) X (2)
SCHEDULE	1 2 3 4 5	1 3 5 7	20
COST	1 2 3 4 5	1 3 5 7	9
IMPLEMENT RISK	1 2 3 4 5	1 3 5 7	6
SURGE	1 2 3 4 5	1 3 5 7	25
CROSS CMND. APPLICATION	1 2 3 4 5	1 3 5 7	28
SAFETY	1 2 3 4 5	1 3 5 7	35
ENVIRONMENTAL HAZARDS	1 2 3 4 5	1 3 5 7	35
TRAINING	1 2 3 4 5	1 3 5 7	3
MAXIMUM SCORE = 280			TOTAL 161

ASSESSMENT OF IMPACT: HIGHEST NUMBER HAS GREATEST BENEFIT OR LEAST AMOUNT OF IMPACT

WEIGHTING FACTOR: HIGHEST NUMBER HAS HIGHEST PRIORITY

LSC-20377G

WEIGHTED RATING CALCULATION

TABLE 4.0-3

CENTER: OC-ALC

FOCUS STUDY RECOMMENDATION: IMPROVE TESTING OF PNEUDRAULIC AIR ACCESSORIES

ATTRIBUTE	ASSESSMENT OF IMPACT (1)	AFLC/MA WEIGHTING FACTOR(2)	WEIGHTED RATING (1) X (2)
SCHEDULE	1 2 3 4 5	1 3 5 7	21
COST	1 2 3 4 5	1 3 5 7	10
IMPLEMENT RISK	1 2 3 4 5	1 3 5 7	35
SURGE	1 2 3 4 5	1 3 5 7	35
CROSS CMND. APPLICATION	1 2 3 4 5	1 3 5 7	15
SAFETY	1 2 3 4 5	1 3 5 7	20
ENVIRONMENTAL HAZARDS	1 2 3 4 5	1 3 5 7	20
TRAINING	1 2 3 4 5	1 3 5 7	20
MAXIMUM SCORE = 280			TOTAL 176

ASSESSMENT OF IMPACT: HIGHEST NUMBER HAS GREATEST BENEFIT OR LEAST AMOUNT OF IMPACT

WEIGHTING FACTOR: HIGHEST NUMBER HAS HIGHEST PRIORITY

LSC-20377L

WEIGHTED RATING CALCULATION
TABLE 4.0-4

CENTER: OC-ALC
FOCUS STUDY RECOMMENDATION: REFINEMENT OF ATE SOFTWARE

ATTRIBUTE	ASSESSMENT OF IMPACT (1)	AFLC/MA WEIGHTING FACTOR(2)	WEIGHTED RATING (1) X (2)
SCHEDULE	1 2 3 4 5	1 3 5 7	15
COST	1 2 3 4 5	1 3 5 7	15
IMPLEMENT RISK	1 2 3 4 5	1 3 5 7	20
SURGE	1 2 3 4 5	1 3 5 7	35
CROSS CMND. APPLICATION	1 2 3 4 5	1 3 5 7	15
SAFETY	1 2 3 4 5	1 3 5 7	15
ENVIRONMENTAL HAZARDS	1 2 3 4 5	1 3 5 7	15
TRAINING	1 2 3 4 5	1 3 5 7	15
MAXIMUM SCORE = 280			TOTAL 145

ASSESSMENT OF IMPACT: HIGHEST NUMBER HAS GREATEST BENEFIT OR LEAST AMOUNT OF IMPACT

WEIGHTING FACTOR: HIGHEST NUMBER HAS HIGHEST PRIORITY

LSC-20377M

WEIGHTED RATING CALCULATION

TABLE 4.0-5

CENTER: OC-ALC

FOCUS STUDY RECOMMENDATION: MANAGEMENT CONTROL SYSTEM (TRACKING INDIRECT LABOR)

ATTRIBUTE	ASSESSMENT OF IMPACT (1)	AFLC/MA WEIGHTING FACTOR(2)	WEIGHTED RATING (1) X (2)
SCHEDULE	1 2 3 4 5	1 3 5 7	15
COST	1 2 3 4 5	1 3 5 7	20
IMPLEMENT RISK	1 2 3 4 5	1 3 5 7	15
SURGE	1 2 3 4 5	1 3 5 7	15
CROSS CMND. APPLICATION	1 2 3 4 5	1 3 5 7	15
SAFETY	1 2 3 4 5	1 3 5 7	15
ENVIRONMENTAL HAZARDS	1 2 3 4 5	1 3 5 7	15
TRAINING	1 2 3 4 5	1 3 5 7	15
MAXIMUM SCORE = 280			TOTAL 125

ASSESSMENT OF IMPACT: HIGHEST NUMBER HAS GREATEST BENEFIT OR LEAST AMOUNT OF IMPACT

WEIGHTING FACTOR: HIGHEST NUMBER HAS HIGHEST PRIORITY

LSC-20377N

WEIGHTED RATING CALCULATION

TABLE 4.0-6

CENTER: OC-ALC
FOCUS STUDY RECOMMENDATION: QUARTERLY BLOCK SCHEDULE SYSTEM

ATTRIBUTE	ASSESSMENT OF IMPACT (1)	AFLC/MA WEIGHTING FACTOR(2)	WEIGHTED RATING (1) X (2)
SCHEDULE	1 2 3 4 5	1 3 5 7	15
COST	1 2 3 4 5	1 3 5 7	15
IMPLEMENT RISK	1 2 3 4 5	1 3 5 7	10
SURGE	1 2 3 4 5	1 3 5 7	20
CROSS CMND. APPLICATION	1 2 3 4 5	1 3 5 7	15
SAFETY	1 2 3 4 5	1 3 5 7	6
ENVIRONMENTAL HAZARDS	1 2 3 4 5	1 3 5 7	15
TRAINING	1 2 3 4 5	1 3 5 7	6
MAXIMUM SCORE = 280			TOTAL 102

ASSESSMENT OF IMPACT: HIGHEST NUMBER HAS GREATEST BENEFIT OR LEAST AMOUNT OF IMPACT

WEIGHTING FACTOR: HIGHEST NUMBER HAS HIGHEST PRIORITY

LSC-20377P

WEIGHTED RATING CALCULATION

TABLE 4.0-7

CENTER: WR-ALC
FOCUS STUDY RECOMMENDATION: COMBINE ROTOR ASSY REPAIR

ATTRIBUTE	ASSESSMENT OF IMPACT (1)	AFLC/MA WEIGHTING FACTOR(2)	WEIGHTED RATING (1) X (2)
SCHEDULE	1 2 3 4 5	1 3 5 7	25
COST	1 2 3 4 5	1 3 5 7	35
IMPLEMENT RISK	1 2 3 4 5	1 3 5 7	12
SURGE	1 2 3 4 5	1 3 5 7	35
CROSS CMND. APPLICATION	1 2 3 4 5	1 3 5 7	20
SAFETY	1 2 3 4 5	1 3 5 7	20
ENVIRONMENTAL HAZARDS	1 2 3 4 5	1 3 5 7	15
TRAINING	1 2 3 4 5	1 3 5 7	25
MAXIMUM SCORE = 280			TOTAL 187

ASSESSMENT OF IMPACT: HIGHEST NUMBER HAS GREATEST BENEFIT OR LEAST AMOUNT OF IMPACT

WEIGHTING FACTOR: HIGHEST NUMBER HAS HIGHEST PRIORITY

LSC-20377E

WEIGHTED RATING CALCULATION

TABLE 4.0-8

CENTER: WR-ALC

FOCUS STUDY RECOMMENDATION: C-141 PETAL DOOR

ATTRIBUTE	ASSESSMENT OF IMPACT (1)					AFLC/MA WEIGHTING FACTOR(2)				WEIGHTED RATING (1) X (2)
SCHEDULE	1	2	3	4	5	1	3	5	7	25
COST	1	2	3	4	5	1	3	5	7	35
IMPLEMENT RISK	1	2	3	4	5	1	3	5	7	12
SURGE	1	2	3	4	5	1	3	5	7	25
CROSS CMND. APPLICATION	1	2	3	4	5	1	3	5	7	9
SAFETY	1	2	3	4	5	1	3	5	7	20
ENVIRONMENTAL HAZARDS	1	2	3	4	5	1	3	5	7	15
TRAINING	1	2	3	4	5	1	3	5	7	25
MAXIMUM SCORE = 280										TOTAL 166

ASSESSMENT OF IMPACT: HIGHEST NUMBER HAS GREATEST BENEFIT OR LEAST AMOUNT OF IMPACT

WEIGHTING FACTOR: HIGHEST NUMBER HAS HIGHEST PRIORITY

LSC-20377K

WEIGHTED RATING CALCULATION
TABLE 4.0-9

CENTER: WR-ALC
FOCUS STUDY RECOMMENDATION: C-141 AILERON TOOLING

ATTRIBUTE	ASSESSMENT OF IMPACT (1)	AFLC/MA WEIGHTING FACTOR(2)	WEIGHTED RATING (1) X (2)
SCHEDULE	1 2 3 4 ⑤	1 3 ⑤ 7	25
COST	1 2 3 4 ⑤	1 3 ⑤ 7	25
IMPLEMENT RISK	1 2 3 ④ 5	1 ③ 5 7	12
SURGE	1 2 3 4 ⑤	1 3 ⑤ 7	25
CROSS CMND. APPLICATION	1 2 ③ 4 5	1 ③ 5 7	9
SAFETY	1 2 3 ④ 5	1 3 ⑤ 7	20
ENVIRONMENTAL HAZARDS	1 2 3 4 ⑤	1 ③ 5 7	15
TRAINING	1 2 3 4 ⑤	1 3 ⑤ 7	25
MAXIMUM SCORE = 280			TOTAL 156

ASSESSMENT OF IMPACT: HIGHEST NUMBER HAS GREATEST BENEFIT OR LEAST AMOUNT OF IMPACT

WEIGHTING FACTOR: HIGHEST NUMBER HAS HIGHEST PRIORITY

LSC-203771I

WEIGHTED RATING CALCULATION
TABLE 4.0-10

CENTER: WR-ALC
FOCUS STUDY RECOMMENDATION: C-141 AFT COWL TOOLING

ATTRIBUTE	ASSESSMENT OF IMPACT (1)	AFLC/MA WEIGHTING FACTOR(2)	WEIGHTED RATING (1) X (2)
SCHEDULE	1 2 3 4 5	1 3 5 7	25
COST	1 2 3 4 5	1 3 5 7	15
IMPLEMENT RISK	1 2 3 4 5	1 3 5 7	12
SURGE	1 2 3 4 5	1 3 5 7	25
CROSS CMND. APPLICATION	1 2 3 4 5	1 3 5 7	9
SAFETY	1 2 3 4 5	1 3 5 7	20
ENVIRONMENTAL HAZARDS	1 2 3 4 5	1 3 5 7	15
TRAINING	1 2 3 4 5	1 3 5 7	25
MAXIMUM SCORE = 280		TOTAL	146

ASSESSMENT OF IMPACT: HIGHEST NUMBER HAS GREATEST BENEFIT OR LEAST AMOUNT OF IMPACT

WEIGHTING FACTOR: HIGHEST NUMBER HAS HIGHEST PRIORITY

LSC-20377J

WEIGHTED RATING CALCULATION
TABLE 4.0-11

CENTER: SA-ALC
FOCUS STUDY RECOMMENDATION: MACHINE FORM PARTS

ATTRIBUTE	ASSESSMENT OF IMPACT (1)	AFLC/MA WEIGHTING FACTOR(2)	WEIGHTED RATING (1) X (2)
SCHEDULE	1 2 3 4 5	1 3 5 7	20
COST	1 2 3 4 5	1 3 5 7	35
IMPLEMENT RISK	1 2 3 4 5	1 3 5 7	20
SURGE	1 2 3 4 5	1 3 5 7	35
CROSS CMND. APPLICATION	1 2 3 4 5	1 3 5 7	20
SAFETY	1 2 3 4 5	1 3 5 7	15
ENVIRONMENTAL HAZARDS	1 2 3 4 5	1 3 5 7	20
TRAINING	1 2 3 4 5	1 3 5 7	20
MAXIMUM SCORE = 280			TOTAL 185

ASSESSMENT OF IMPACT: HIGHEST NUMBER HAS GREATEST BENEFIT OR LEAST AMOUNT OF IMPACT
WEIGHTING FACTOR: HIGHEST NUMBER HAS HIGHEST PRIORITY

LSC-20377R

WEIGHTED RATING CALCULATION
TABLE 4.0-12

CENTER: SA-ALC
FOCUS STUDY RECOMMENDATION: MACHINE CUTTING PARTS

ATTRIBUTE	ASSESSMENT OF IMPACT (1)	AFLC/MA WEIGHTING FACTOR(2)	WEIGHTED RATING (1) X (2)
SCHEDULE	1 2 3 4 5	1 3 5 7	15
COST	1 2 3 4 5	1 3 5 7	15
IMPLEMENT RISK	1 2 3 4 5	1 3 5 7	20
SURGE	1 2 3 4 5	1 3 5 7	20
CROSS CMND. APPLICATION	1 2 3 4 5	1 3 5 7	15
SAFETY	1 2 3 4 5	1 3 5 7	20
ENVIRONMENTAL HAZARDS	1 2 3 4 5	1 3 5 7	15
TRAINING	1 2 3 4 5	1 3 5 7	20
MAXIMUM SCORE = 280			TOTAL 140

ASSESSMENT OF IMPACT: HIGHEST NUMBER HAS GREATEST BENEFIT OR LEAST AMOUNT OF IMPACT
WEIGHTING FACTOR: HIGHEST NUMBER HAS HIGHEST PRIORITY

LSC-20377S

WEIGHTED RATING CALCULATION
TABLE 4.0-13

CENTER: SA-ALC
FOCUS STUDY RECOMMENDATION: BALANCE PROCESS FLOW

ATTRIBUTE	ASSESSMENT OF IMPACT (1)	AFLC/MA WEIGHTING FACTOR(2)	WEIGHTED RATING (1) X (2)
SCHEDULE	1 2 3 4 5	1 3 5 7	20
COST	1 2 3 4 5	1 3 5 7	15
IMPLEMENT RISK	1 2 3 4 5	1 3 5 7	9
SURGE	1 2 3 4 5	1 3 5 7	35
CROSS CMND. APPLICATION	1 2 3 4 5	1 3 5 7	15
SAFETY	1 2 3 4 5	1 3 5 7	9
ENVIRONMENTAL HAZARDS	1 2 3 4 5	1 3 5 7	9
TRAINING	1 2 3 4 5	1 3 5 7	15
MAXIMUM SCORE = 280			TOTAL 127

ASSESSMENT OF IMPACT: HIGHEST NUMBER HAS GREATEST BENEFIT OR LEAST AMOUNT OF IMPACT

WEIGHTING FACTOR: HIGHEST NUMBER HAS HIGHEST PRIORITY

LSC-20377T

WEIGHTED RATING CALCULATION

TABLE 4.0-14

CENTER: SA-ALC

FOCUS STUDY RECOMMENDATION: IMPROVE PARTS CLEANING (BLDG. 329)

ATTRIBUTE	ASSESSMENT OF IMPACT (1)	AFLC/MA WEIGHTING FACTOR(2)	WEIGHTED RATING (1) X (2)
SCHEDULE	1 2 3 4 5	1 3 5 7	20
COST	1 2 3 4 5	1 3 5 7	15
IMPLEMENT RISK	1 2 3 4 5	1 3 5 7	10
SURGE	1 2 3 4 5	1 3 5 7	20
CROSS CMND. APPLICATION	1 2 3 4 5	1 3 5 7	15
SAFETY	1 2 3 4 5	1 3 5 7	6
ENVIRONMENTAL HAZARDS	1 2 3 4 5	1 3 5 7	20
TRAINING	1 2 3 4 5	1 3 5 7	12
MAXIMUM SCORE = 280			TOTAL 118

ASSESSMENT OF IMPACT: HIGHEST NUMBER HAS GREATEST BENEFIT OR LEAST AMOUNT OF IMPACT

WEIGHTING FACTOR: HIGHEST NUMBER HAS HIGHEST PRIORITY

LSC-20377U

COMMAND WIDE APPLICABILITY OF FOCUS STUDY RECOMMENDATIONS (NPV $ FY89, THOUSANDS)

TABLE 4.0-15 (SHEET 1 OF 2)

	TITLE	AFLC	AGMC	OC-ALC	OO-ALC	SA-ALC	SM-ALC	WR-ALC
AGMC	IMPROVE UTILIZATION OF GYRO ATE (1)	$3,633	$701					$2,932
	IMPROVE REPAIR PROCESS OF GRU (2)	$570	($33)					$603
OC-ALC	GREATER EQUIPMENT MANPOWER FLEXIBILITY TESTING PNEUDRAULIC ACCESSORIES (1)	$1,721		$1,721				
	DEVELOP AND IMPLEMENT A QUARTERLY BLOCK SCHEDULE SYSTEM BASED ON MANPOWER AND EQUIPMENT CAPACITY (4)	$132		$192				
	TRACKING OF INDIRECT LABOR HOURS (3)	$1,828		$1,828				
	IMPROVEMENT OF ATE SOFTWARE (2)	$414		$414				
SA-ALC	MACHINE FORM PARTS (1)	$1,231				$1,231		
	MACHINE CUTTING PARTS (2)	$143				$143		
	BALANCE PROCESS FLOW (3)	$0				$0		
	IMPROVE PARTS CLEANING (4)	$0				$0		

* NPV VARIANCE DUE TO COMBINED PERFORMANCE OF ALL THREE.

(x) REPRESENTS MDMSC RECOMMENDED FOCUS STUDY RATING FOR NOTED ALC.

LSC-20386C

COMMAND WIDE APPLICABILITY OF FOCUS STUDY RECOMMENDATIONS
(NPV $ FY89, THOUSANDS)
TABLE 4.0-15 (SHEET 2 OF 2)

	TITLE	AFLC	AGMC	OC-ALC	OO-ALC	SA-ALC	SM-ALC	WR-ALC
SM-ALC	ALTERNATIVE CLEANING METHOD (ENVIRONMENTAL CONCERN, NOT QUANTIFIABLE.)	N/A					N/A	
WR-ALC	C-141 AILERON, PETAL DOOR AND AFT COWL TOOLING (COMBINED IMPLEMENTATION)	$1,546*						$1,546*
	C-141 AILERON TOOLING 3	$535						$535
	C-141 PETAL DOOR TOOLING 2	($81)						($81)
	C-141 AFT COWL TOOLING 4	$806						$806
	COMBINE ROTOR ASSY REPAIR 1	$1,570						$1,570
TOTAL		$12,848	$668	$4,155		$1,374	$0	$6,651

ⓧ REPRESENTS MDMSC RECOMMENDED FOCUS STUDY RATING FOR NOTED ALC.

LSC-20386C

4.1 AEROSPACE GUIDANCE AND METROLOGY CENTER (AGMC)

Process characterization at AGMC was performed on RCC MATBGA. MATBGA is responsible for repair of navigational gyroscope units. The AGMC Volume II reports (CSR and QFP) contain two focus study and eight quick fix recommendations with total combined estimated annual budget savings potential of $364K if all recommendations are implemented. The savings from both focus studies presume incorporation of their recommendations at Warner Robins Air Logistics Center in conjunction with AGMC. MDMSC observed that some areas for improvement identified by the Technology Insertion Engineer Services (TI-ES) team are also addressed in AGMC improvement plans. After reviewing the proposed quick fixes and focus studies, those that were selected to be pursued were included in the AGMC CSR and QFP. A summary of those improvement opportunities is provided in Tables 4.1-1 and 4.1-2 below and in the following text.

4.1.1 Focus Studies (2)

Applicability	Title/CSR Ref. Paragraph/Description
• MAPBGA (AGMC) MANPGB (WR-ALC)	To Determine Improved Methods to Unseal, Depaint, Seal, Leak Check, and Paint GRUs; paragraph 5.1.4: Proposes an analysis of subject GRU repair process technology to develop productivity and safety improvement recommendations. Estimated annual budget savings of $245K if implemented in both RCCs.
• MAPBGA (AGMC) MANPGB (WR-ALC)	To Improve Utilization of Gyro Automatic Test Equipment (ATE); paragraph 5.1.5: Proposes investigation of maintenance problems associated with ATE in these RCCs to determine improved methods of utilizing the sophisticated automated test stations. Estimated annual budget savings of $1,048K if implemented in both RCCs.

AGMC FOCUS STUDY RECOMMENDATION SUMMARY

TABLE 4.1-1

MDMSC RECOMMENDATION	IMPACT	ANNUAL BUDGET SAVINGS	COST AVOIDANCE			INVESTMENT COST
			FLOW TIME REDUCTION	WIP INVENTORY REDUCTION*	FLOOR SPACE REDUCTION	
IMPROVE GYRO REPAIR METHODS	DIRECT LABOR SAVINGS (DLS), ENVIRONMENTAL IMPROVMENT	$245,158**	0 DAYS	$ 0	0 SQ. FT.	$341,122**
IMPROVE ATE UTILIZATION	DLS	$1,048,006**	0 DAYS	$ 0	0 SQ. FT.	$281,000**
TOTALS		$1,293,164**	0 DAYS	$0	0 SQ. FT.	$622,122**

NOTES: * WIP INVENTORY REDUCTION = $\frac{\text{\# OF FLOW DAYS REDUCED}}{\text{365DAYS}}$ X (ASSET $ VALUE) X (YEARLY PRODUCTION RATE)

** SAVINGS AND INVESTMENT COSTS ARE ATTRIBUTABLE TO RECOMMENDATIONS BEING IMPLEMENTED AT MAPBGA/AGMC AND MANPGB/WR-ALC

LSC-20578A

AGMC QUICK FIX RECOMMENDATION SUMMARY
TABLE 4.1-2

MDMSC RECOMMENDATION	IMPACT	ANNUAL BUDGET SAVINGS	COST AVOIDANCE			INVESTMENT COST
			FLOW TIME REDUCTION	WIP INVENTORY REDUCTION*	FLOOR SPACE REDUCTION	
STANDARDIZE GRU DECAL TAPE	DIRECT LABOR SAVINGS	$14,557	0 DAYS	$ 0	0 SQ. FT	**
IMPROVE 2171s RESEALING CONSISTENCY	DIRECT LABOR SAVINGS	$14,557	0 DAYS	$ 0	0 SQ. FT	**
IMPROVE CN 1375 WHEEL VACUUM PUMPDOWN	DIRECT LABOR SAVINGS	$10,455	0 DAYS	$ 0	0 SQ. FT	**
ENHANCE CN1375 BEARING ASS'Y *PRELOAD*	DIRECT LABOR SAVINGS	$5,228	0 DAYS	$ 0	0 SQ. FT	**
ELIMINATE MECHANICAL WIRE STRIPPING	DIRECT LABOR SAVINGS	$4,997	0 DAYS	$ 0	0 SQ. FT	**
DETERMINE VIABLE REPLACEMENT FOR ACETONE	IMPROVE SAFETY, ENVIRONMENT	NQ	NQ	NQ	NQ	NQ
DETERMINE UNIFORM WHEEL RUN-IN TEST	DIRECT LABOR SAVINGS	NQ	NQ	NQ	NQ	NQ
DETERMINE FEASIBILITY OF CONSISTENT, COMMAND-WIDE COMPUTER BASED TRAINING	IMPROVE WORKFORCE TRAINING	NQ	NQ	NQ	NQ	NQ
TOTALS		$49,794	0 DAYS	$0	0 SQ. FT.	*** $ 9859

NOTES: * WIP INVENTORY REDUCTION = $\frac{\text{\# OF FLOW DAYS REDUCED}}{\text{365DAYS}}$ X (ASSET $ VALUE) X (YEARLY PRODUCTION RATE)

** NOT SEPARATELY PRICED

*** TOTAL FOR ALL QUICK FIXES ESTIMATED AT 20% OF COMBINED ANNUAL BUDGET SAVINGS

LSC-20579A

4.1.2 Quick Fixes (8)

Applicability	Title/QFP Ref. Paragraph/Description
• MAPGBA	Standardize the GRU Cover Decal Tape Material at AGMC; paragraph 2.1: Recommends that a single 3M brand film tape, such as "Scotchcal," be utilized for all decal applications due to its durability, ease of application and removal, and minimum adhesive residue characteristics. Estimated annual budget savings of $14.5K.
• MAPBGA	Improve Consistency of Resealing 2171 GRU Covers at AGMC; paragraph 2.4: Recommends using a holding fixture to maintain seal ring alignment to cover assembly during manual resoldering. This will improve alignment and reduce rework and potential leak failure of the 2171 GRU. Estimated annual budget savings of $14.5K.
• MAPBGA	Improve CN1375 Wheel Assembly Vacuum Pumpdown and Refill Operation; paragraph 2.6: Recommends a QP4 task team evaluate control factors affecting the Veeco system performance and determine necessary corrective action to eliminate the current secondary test restart procedure. Estimated annual cost savings of $10.5K.
• MAPBGA	Enhance the CN1375 Bearing Assembly Preload Method; paragraph 2.7: Recommends developing some minor fixturing revisions to improve throughput and accuracy by eliminating several non-value added sequences. Estimated annual cost savings of $5K.

- MAPBGA — Eliminate Mechanical Stripping of GRU Flex Wire Leads at AGMC; paragraph 2.2: Proposes flex leads be purchased pre-stripped and tinned or a separate, well-ventilated workstation be set up to chemically strip off the wire insulating material with sodium hydroxide or alternate solution. Estimated annual budget savings of $5K.

- MAPBGA — Determine Possible Replacement for Acetone as a Solder Flux Removal Agent at AGMC; paragraph 2.8: Recommends introducing viable, less hazardous solder flux cleaning solutions where applicable. Yearly savings are not quantifiable for this safety-related quick fix opportunity.

- MAPBGA — Utilize Uniform Cycle Times To Perform Gyroscopic Wheel Run-In Test; paragraph 2.5: Proposes test data be gathered and analyzed by a QP4 team to determine a uniform test procedure of shorter duration. Yearly savings are unquantifiable until the feasibility of a uniform test procedure is approved for each GRU PCN application.

- MAPGBA — Determine the Feasibility of Licensing AFLC to Utilize MDAIS Computer-Based Personal Computer (PC) Training Courses at AGMC; paragraph 2.3: Recommends that AFLC examine the command-wide applicability of utilizing MDC's existing formatted training materials for their in-house employee training efforts. Intangible yearly savings could be significant, but MDMSC cannot quantify at this time.

TASK ORDER NO. 1
PROCESS CHARACTERIZATION

AFLC may realize an estimated $1.3M in recurring savings if all of the focus studies and all the quick fix plan opportunities are incorporated, including those applicable to both AGMC and WR-ALC.

4.2 OKLAHOMA CITY AIR LOGISTICS CENTER (OC-ALC)

Process characterization at OC-ALC included 20 RCCs: MABPAB, MABPFF, MATPAA, MATPAB, MATPAT, MATPCA, MATPCB, MATPCC, MATPCD, MATPCM, MATPFA, MATPFE, MATPFF, MATPHA, MATPHB, MATPHE, MATPIA, MATPIM, MATPIN, and MATPIW. These RCCs perform a wide variety of aircraft and aircraft component remanufacturing and test operations. Process characterization resulted in four focus study recommendations with a combined annual budget savings of $1,705K, and 24 quick fix opportunities with a combined annual budget savings of $2,078K, and 199 other observations that should be considered for additional improvements. (Of the 24 quick fixes, six apply to more than one RCC). The total estimated annual budget savings to be realized from implementation of all OC-ALC recommendations is $3,784K. (See paragraph 1.0, Table 1.0-2).

MDMSC observed that same areas for improvement identified by the TI-ES team are also addressed in OC-ALC improvement plans. After reviewing the proposed quick fixes and focus studies, those selected to be pursued were included in the OC-ALC CSR and QFP. A summary of those improvement opportunities is provided in Tables 4.2-1 and 4.2-2 and in the following text.

4.2.1 Focus Studies (4)

Applicability	Title/CSR Ref. Paragraph/Description
• MATPAT	Equipment/Manpower Flexibility; paragraph 6.5.4: Proposes greater flexibility of manpower and equipment to eliminate test cell specializations and the resulting queues which has precipitated a 3-shift operation. Estimated annual cost savings of $729K.
• MATPAT	Quarterly Block Schedule System Based on Manpower and Equipment Capacity; paragraph 6.5.5: Proposes reducing the number of setups per item and increasing the length of item runs. Estimated annual cost savings of $75,5K.

OC-ALC FOCUS STUDY RECOMMENDATION SUMMARY
TABLE 4.2-1

MDMSC RECOMMENDATION	IMPACT	ANNUAL BUDGET SAVINGS	COST AVOIDANCE			INVESTMENT COST
			FLOW TIME REDUCTION	WIP INVENTORY REDUCTION*	FLOOR SPACE REDUCTION	
EQUIPMENT/MANPOWER FLEXIBILITY (MATPAT)	DIRECT LABOR SAVINGS	$729,306	0 DAYS	$0	0 SQ. FT.	$1,016,127
BLOCK SCHEDULE SYSTEM (MATPAT)	DIRECT LABOR SAVINGS	$75,452	0 DAYS	$0	0 SQ. FT.	$101,000
IMPROVE ATE SOFTWARE (MATPFF)	DIRECT LABOR SAVINGS	$243,739	15 DAYS (EST.)	$0	0 SQ. FT.	$470,000
TRACKING INDIRECT LABOR HOURS	DIRECT LABOR SAVINGS	$656,375	0 DAYS	$0	0 SQ. FT.	$588,188
TOTALS		$1,704,872	15 DAYS	$0	0 SQ. FT.	$2,175,315

NOTES: * WIP INVENTORY REDUCTION = $\frac{\text{\# OF FLOW DAYS REDUCED}}{\text{365 DAYS}}$ X (ASSET $ VALUE) X (YEARLY PRODUCTION RATE)

LSC-20653A

OC-ALC QUICK FIX RECOMMENDATION SUMMARY

TABLE 4.2-2 (PAGE 1 OF 4)

MDMSC RECOMMENDATION	IMPACT	ANNUAL BUDGET SAVINGS	COST AVOIDANCE			INVESTMENT COST
			FLOW TIME REDUCTION	WIP INVENTORY REDUCTION*	FLOOR SPACE REDUCTION	
REPAIR CONTROL RELAY BOX, PCN 35113A (MATPCA)	MATERIAL SAVINGS	$98,700	0 DAYS	$0	0 SQ. FT.	$0
IMPROVE HOOD DESIGN ON OC1202 AND OC1 · 12, BLDG. 3108 (MATPCB)	HEALTH AND SAFETY	$0	0 DAYS	$0	0 SQ. FT.	UNKNOWN
REWORKING MUSCLE VALVE HOUSING AND HOUSING COVER FOR 96571A CONTROL ASSEMBLY (MATPCD)	MATERIAL SAVINGS	$99,938	0 DAYS	$0	0 SQ. FT.	$0
IMPROVE MACHINE HANDLING AND ACCURACY BY INSTALLING DIGITAL READOUTS (MATPCM)	DIRECT LABOR SAVINGS (PROCESS)	$37,098	0 DAYS	$0	0 SQ. FT.	$20,950
REDUCE FLOW DAYS AND INCREASE SHOP CAPACITY OF SHEET METAL REPAIR PROCESS (MABPAB)	INVENTORY REDUCTION	$0	1 DAY (EST.)	$0	0 SQ. FT.	$0
DECREASE FLOW TIME BY UTILIZING A TRANSPORT FIXTURE FOR WING FLAPS (MABPFF)	DIRECT LABOR (TRANSIT)	$5,974	1 DAY (EST.)	$0	0 SQ. FT.	$7,500
DECREASE FLOW TIME BY PERFORMING INSPECTION OF NOSE COWLS AT PAINT SHOP (MABPFF)	DIRECT LABOR (TRANSIT)	$4,242	2 DAYS (EST.)	$0	0 SQ. FT.	$0

LSC-20654A

OC-ALC QUICK FIX RECOMMENDATION SUMMARY

TABLE 4.2-2 (PAGE 2 OF 4)

MDMSC RECOMMENDATION	IMPACT	ANNUAL BUDGET SAVINGS	COST AVOIDANCE			INVESTMENT COST
			FLOW TIME REDUCTION	WIP INVENTORY REDUCTION*	FLOOR SPACE REDUCTION	
TRANSPORT CART FOR BOMB BAY DOORS (MABPFF)	DIRECT LABOR (TRANSIT)	$1,792	1 DAY (EST.)	$0	0 SQ. FT.	$3,000
MOVE A DAY'S SUPPLY OF UNITS FROM CAGE TO WORK AREA USING ONE OPERATOR (MATPAA) (MATPAB)	DIRECT LABOR (TRANSIT)	$293,787	0 DAYS	$0	0 SQ. FT.	$0
ELIMINATE REJECTION OF SOLENOID BY PROCURING ALL SOLENOIDS FROM CONSOLIDATED CONTROLS (MATPAA)	DIRECT LABOR (REPAIR)	$10,604	0 DAYS	$0	0 SQ. FT.	$0
PROVIDE PORTABLE POWER TOOLS IN ASSY/DISASSY AREA (MATPAA) (MATPAB)	DIRECT LABOR (PROCESS)	$170,623	0 DAYS	$0	0 SQ. FT.	$24,000
ORGANIZE WORKBENCHES TO CREATE MORE SPACE FOR ASSY WORK (MATPAA) (MATPAB)	DIRECT LABOR (PROCESS)	$56,872	0 DAYS	$0	0 SQ. FT.	$8,000
REPAIR INSTEAD OF REPLACE CYLINDER ASSY BY RECOATING DAMAGED VARNISH (MATPAB)	MATERIAL SAVINGS	$11,850	0 DAYS	$0	0 SQ. FT.	$55,440
REDUCE MANUAL LIFTING OF HEAVY FIXTURES AND IMPROVE SAFETY FACTORS (MATPAT)	SAFETY AND DIRECT LABOR	$9,725	0 DAYS	$0	0 SQ. FT.	$1,000

LSC-20654A

OC-ALC QUICK FIX RECOMMENDATION SUMMARY

TABLE 4.2-2 (PAGE 3 OF 4)

MDMSC RECOMMENDATION	IMPACT	ANNUAL BUDGET SAVINGS	COST AVOIDANCE			INVESTMENT COST
			FLOW TIME REDUCTION	WIP INVENTORY REDUCTION*	FLOOR SPACE REDUCTION	
BETTER UTILIZE LABOR (MATPCC)	DIRECT LABOR	$31,364	0 DAYS	$0	0 SQ. FT.	$1,000
REDUCE EXPENSES IN MATPCC BY REPAIRING IMPELLER UNITS RATHER THAN PURCHASING THEM	MATERIAL SAVINGS	$90,360	0 DAYS	$0	0 SQ. FT.	$0
REDUCE MANPOWER NEEDED TO TEST HARNESS CABLES (MATPCC)	DIRECT LABOR	$20,909	0 DAYS	$0	0 SQ. FT.	$0
DECREASE REPAIR FLOW TIME BY UTILIZING WORK LEADER (MATPFA, MATPFE, MATPFF)	DIRECT LABOR	$253,230	0 DAYS	$0	0 SQ. FT.	$2,500
DECREASE REPAIR TIME BY RETAINING EXPERIENCED WORKERS (MATPFA, MATPFE, MATPFF)	DIRECT LABOR	$364,933	0 DAYS	$0	0 SQ. FT.	$0
DECREASE FLOW TIMES TO REPAIR PRESSURE RATIO TRANSDUCER (MATPFE)	DIRECT LABOR	$4,803	0 DAYS	$0	0 SQ. FT.	UNKNOWN
ELIMINATE UNNECESSARY TESTING OF PUMPS (MATPHA) (MATPHB)	DIRECT LABOR	$119,800	0 DAYS	$0	0 SQ. FT.	$0
DECREASE FLOW TIME ON TUBING REPAIR (MATPIW)	DIRECT LABOR	$8,334	0 DAYS			$0

LSC-20654A

OC-ALC QUICK FIX RECOMMENDATION SUMMARY
TABLE 4.2-2 (PAGE 4 OF 4)

MDMSC RECOMMENDATION	IMPACT	ANNUAL BUDGET SAVINGS	COST AVOIDANCE			INVESTMENT COST
			FLOW TIME REDUCTION	WIP INVENTORY REDUCTION*	FLOOR SPACE REDUCTION	
DECREASE FLOW TIME BY ELIMINATING TRANSPORT OF TUBES TO MATPIW (MATPIW)	DIRECT LABOR	$10,538	0 DAYS	$0	0 SQ. FT.	$0
REDUCE PART SCRAP RATE (MATPHE)	MATERIAL COSTS AND DIRECT LABOR	$373,120	0 DAYS	$0	0 SQ. FT.	$4,500
TOTALS		$2,078,596	5 DAYS	$0	0 SQ. FT.	$72,004

LSC-20654A

Applicability	Title/CSR Ref. Paragraph/Description
• MATPFF	Improve Automatic Testing Equipment (ATE) Software; paragraph 6.13.4: Proposes improving the capability of isolating the specific problem to reduce repair time. Estimated annual cost savings of $468K. Also, flow time will be reduced by seven days.
• MATPCB	Tracking of Indirect Labor Hours; paragraph 6.7.4: Proposes giving management a tool for identifying the causes of non-productive paid manhours and controlling their impact on overall ALC operations. Estimated annual cost savings are $656K.

4.2.2 Quick Fixes (24)

Applicability	Title/QFP Ref. Paragraph/Description
• MATPCA	Control Relay Box (PCN 35113A); paragraph 6.6.1: Recommends repairing repairable amplifier assemblies. As this item is not presently being repaired, the control relay box is replaced at a cost of $2,700/item. Repair of this subassembly would result in a savings of approximately $99K annually.
• MATPCB	Hood Design on Manifold/Nozzle Test Stations (OC 1202 and 1132); paragraph 6.7.1: Recommends redesigned hood using neoprene seals and metal tongue in groove mating to alleviate a hazardous condition. Fuel spray is escaping the chamber, collecting on floor and equipment. (Safety concern, not readily quantifiable.)

- MATPCD — Replacement versus Repair of Muscle Valve Housing and Cover (PCN 965711A); paragraph 6.9.1: Recommends that the muscle valve housing be reworked by plug welding and redrilling of holes when repair is required. MDMSC also recommends that the cover be repaired by replating. Estimated annual budget savings of $100K.

- MATPCM — Installation of Digital Readouts; paragraph 6.10.1: Recommends to increase accuracy and processing times on various milling machines and lathes. Estimated annual budget savings of $37K.

- MABPAB — Implementing A Mobile Tagging Unit Concept; paragraph 6.1.1: Proposes subject as all tagging and conditioning operations may be performed at the paint shop. A reduction of one flow day is projected. An annual savings is not applicable for this improvement.

- MABPFF — Utilizing a Transport Fixture for the Wing Flaps; paragraph 6.2.1: Recommends constructing a fixture to reduce the time and manpower needed to move the flaps, and to allow them to be moved under adverse weather conditions. Estimated annual cost savings of $6K.

- MABPFF — Performing the Inspection and Buy-off of the Nose Cowls Repaired at the Paint Shop; paragraph 6.2.2: Recommends to eliminating return of nose cowls back to MABPAB after painting. Estimated annual budget savings of $4K.

- MABPFF — Utilizing a Second Transport Fixture for the Bomb Bay Doors; paragraph 6.2.3: Proposes constructing a fixture similar to one already in use. Once the doors are loaded onto a cart, they will then not have to be unloaded until they are delivered to supply. Estimated annual budget savings of $2K.

- MATPAA MATPAB — Transporting a Full Day's Supply of Items from the Supply Cage at the Start of the Shift; paragraph 6.3.1: Recommends that one worker be assigned to bring over a day's work to the RCC in one trip. This would prevent each worker from having to leave the work area to bring over single units. Estimated annual budget savings of $174.5K for MATPAA and $119K for MATPAB.

- MATPAA — Eliminating High Reject Solenoids; paragraph 6.3.2: Recommends purchasing solenoids from Consolidated Controls rather than Kaiser Ekel. Kaiser Ekel's defect rate is 40%. Estimated annual budget savings of $10.6K.

- MATPAA MATPAB — Using Power Tools for Assembly/Disassembly; paragraph 6.3.3: Recommends to providING a more efficient means of unfastening and fastening nuts, screws, and bolts. Estimated annual budget savings of $88.5K for MATPAA and $82K for MATPAB.

- MATPAA MATPAB — Organizing Work Benches; paragraph 6.3.4: Recommends creating more working space through the use of rotating bins. Estimated annual budget savings of $29.5K for MATPAA and $27K for MATPAB.

- MATPAB — Repairing Rather than Replacing (Purchasing) Cylinder Assemblies; paragraph 6.4.4: Proposes recoating of cylinder bores with varnish. Estimated annual budget savings of $12K.

- MATPAT — Reduction of Manual Lifting of Heavy Fixtures; paragraph 6.5.1: Proposes using a jib crane which would require less labor and increase safety. A yearly savings of $9.7K may be realized.

- MATPCC — Using a Bulk Handling System for the Items; paragraph 6.8.1: Recommends establishing procedures to eliminate the movement of individual items by the mechanics. Estimated annual budget savings of $31K.

- MATPCC — Repairing Rather than Replacing Impellers; paragraph 6.8.2: Proposes that a repair procedure be established for the impellers to eliminate the need to purchase new ones. Estimated annual budget savings of $90K.

- MATPCC — Automating the Testing of the Harness Cables; paragraph 6.8.3: Recommends automation of the tester. This will free up the mechanic who currently runs the test. Estimated annual budget savings of $21K.

- MATPFA, MATPFE, MATPFF — Decreasing the Repair Time on Problem Parts by Utilizing a Work Leader; paragraph 6.11.1: Proposes creating a leader position to prevent repair operations from being delayed when mechanics running into problems that they do not know how to handle. Estimated annual budget savings of $253K (evaluated in conjunction with MATPFE and MATPFF).

- MATPFA, MATPFE, MATPFF — Decreasing the Repair Time by Retaining Experienced Workers; paragraph 6.11.2: Proposes a review of the compensation rates to insure that workers feel that they are being paid fairly for the work which they do. Estimated annual budget savings of $365K (evaluated in conjunction with MATPFE and MATPFF).

- MATPFE — Decreasing Flow Time to Repair Pressure Ratio Transducer; paragraph 6.12.1: Recommends deleting test prior to repair. Estimated annual budget savings of $4.8K.

- MATPHA MATPHB — Eliminate Unnecessary Testing of CSD Pumps; paragraph 6.14.1, 6.15.1: Recommends deleting test requirement after disassembly since the failure rate is less than 1%. Test pumps at final test. Estimated annual budget savings of $74K for MATPHA and $45.5K for MATPHB.

- MATPIW — To Decrease the Flow Time on Tubing Repair; paragraph 6.20.1: Recommends removing a lid from a cleaning tank to streamline the process of putting the tubes into the tank and removing them later. Estimated annual budget savings of $8.3K.

- MATPIW — To Decrease Flow Time by Eliminating the Transporting of Tubes; paragraph 6.20.2: Recommends that a tubing repair area be set up in MATPIA to eliminate the need to move tubes to and from MATPIW. Estimated annual budget savings of $10.5K.

- MATPHE — Reduce Part Scrap Rate; paragraph 6.16.1: Recommends providing compartment trays for disassembled parts. These trays will eliminate various types of nicks and scratches caused by handling. Estimated annual budget savings of $373K.

4.3 OGDEN AIR LOGISTICS CENTER (OO-ALC)

Process characterization at OO-ALC was undertaken for seven RCCs: MANPGP, MANPGW, MANPRA, MANPRB, MANPRC, MANPWW, and MANPNA. These RCCs perform remanufacturing and test operations on aircraft wheels, brakes, and landing gear struts. The process characterization of these areas is ongoing. Results will be published upon completion of simulation model validation, experimentation and analysis.

4.4 SAN ANTONIO AIR LOGISTICS CENTER (SA-ALC)

Process characterization at SA-ALC was completed for seven RCCs--three in Technology Repair Division (MAT) and four in Aircraft Division (MAB): MATPGB, MATPSI, MATPSS, MABPSA, MABPSB, MABPSC, and MABPSP. Those in MAT overhaul gas turbine engines and aircraft accessories, and those in MAB process various aircraft engine cowl and flight control parts for sheet metal repair or manufacturing. As a result of SA-ALC process characterization, MDMSC has submitted four focus study recommendations with a combined estimated annual budget savings of $526K, and six quick fixes with an estimated combined annual budget savings of $84K. The total estimated annual budget savings from implementation of all recommended focus studies and quick fixes is $610K (see paragraph 1.0, Table 1.0-2).

MDMSC observed that some areas for improvement identified by the TI-ES team are also addressed in SA-ALC improvement plans. After reviewing the proposed improvement opportunities, those selected to be pursued as focus studies and quick fixes were included in the SA-ALC CSR and QFP. A summary of those improvement opportunities is provided in Tables 4.4-1 and 4.4-2 and in the following text.

4.4.1 Focus Studies (4)

Applicability	Title/CSR Ref. Paragraph/Description
• MABPSC	Improve Product Quality and Cost by Machine Forming of Parts; paragraph 8.3.4: Proposes a significant reduction in manhours by machine forming of may parts presently formed manually. Estimated annual budget savings of $428K.
• MABPSC	Provide an Efficient Process for Cutting Parts to Outline; paragraph 8.3.5: Proposes using steel rule dies to blank out parts to outline resulting in faster, more effective fabrication of parts. Estimated annual budget savings of $97K.

SA-ALC FOCUS STUDY RECOMMENDATION SUMMARY

TABLE 4.4-1

MDMSC RECOMMENDATION		IMPACT	ANNUAL BUDGET SAVINGS	COST AVOIDANCE			INVESTMENT COST
				FLOW TIME REDUCTION	WIP INVENTORY REDUCTION*	FLOOR SPACE REDUCTION	
8.3.4	MACHINE FORM PARTS (MARPSC)	DIRECT LABOR SAVINGS	$ 428,197	0 DAYS	$ 0	0 SQ. FT.	$ 375,000
8.3.5	MACHINE CUTTING PARTS (MABPSC)	DIRECT LABOR SAVINGS	$ 97,310	0 DAYS	$ 0	0 SQ. FT.	$ 225,000
8.5.4	BALANCE PROCESS FLOW (MATPGB, MATPSI, MATPSS)	INVENTORY REDUCTION	$ 0	TBD	$ 24,000,000	16K SQ. FT.	$ 380,000
8.6.4	IMPROVE PARTS CLEANING - BLDG. 329 (MATPSI)	INVENTORY REDUCTION	$ 0	23 DAYS	$ 367,000	0 SQ. FT.	$ 250,000
TOTALS			$ 525,507	23 DAYS	$ 24,367,000	16K SQ. FT.	$ 1,230,000

NOTES: * WIP INVENTORY REDUCTION = $\frac{\text{\# OF FLOW DAYS REDUCED}}{\text{365DAYS}}$ X (ASSET $ VALUE) X (YEARLY PRODUCTION RATE)

LSC-20602A

SA-ALC QUICK FIX RECOMMENDATION SUMMARY

TABLE 4.4-2

	MDMSC RECOMMENDATION	IMPACT	BUDGET SAVINGS	COST AVOIDANCE			INVESTMENT COST
				FLOW TIME REDUCTION	WIP INVENTORY REDUCTION*	FLOOR SPACE REDUCTION	
8.3.1	CUT STOCK TO SIZE (MABPSC)	DIRECT LABOR SAVINGS	$ 31,150	0 DAYS	$ 0	0 SQ. FT.	$ 13,240
8.3.4	BRIDGE CRANE (MABPSC)	DIRECT LABOR SAVINGS	$ 24,100	0 DAYS	$ 0	0 SQ. FT.	$ 22,000
8.7.3	TRANSFER INSPECTION WCDs (MATPSI, MATPSS)	DIRECT LABOR SAVINGS	$ 11,200	0 DAYS	$ 0	0 SQ. FT.	$ 500
8.3.3	ID TAGS (MABPSC)	DIRECT LABOR SAVINGS	$ 10,190	0 DAYS	$ 0	0 SQ. FT.	$ 0
8.3.2	FREEZER CHESTS (MABPSC)	DIRECT LABOR SAVINGS	$ 4,700	0 DAYS	$ 0	0 SQ. FT.	$ 1,500
8.2.1	DYE PENETRANT INSPECTION (MABPSB)	DIRECT LABOR SAVINGS	$ 2,700	0 DAYS	$ 0	0 SQ. FT.	$ 690
	TOTALS		$ 84,040	0 DAYS	$ 0	0 SQ. FT.	$ 37,930

NOTES: * WIP INVENTORY REDUCTION = $\frac{\text{\# OF FLOW DAYS REDUCED}}{\text{365DAYS}}$ X (ASSET $ VALUE) X (YEARLY PRODUCTION RATE)

QUICK FIXES ARE LISTED HERE IN DESCENDING ORDER OF BUDGET ORDER OF BUDGET SAVINGS, NOT THE SEQUENCE OF PARAGRAPH 8.0 TEXT.

LSC-20601A

- MATPGB MATPSI — Reduction of Parts Inventory and Improvement in Flow Time/ Throughput; paragraph 8.5.4: Proposes a multi-faceted approach to reducing Work in Process (WIP) inventory for all RCCs. Substantial annual cost avoidance savings of $24M are estimated, supported by simulation model experimentation. In addition, approximately 16K square feet of floor space would be freed for other use.
- MATPSS

- MATPSI MATPGB — Improvements in Parts Cleaning in Building 329; paragraph 8.6.4: Proposes centralizing all MAT cleaning processes in Building 329, including adding chemical cleaning capacity for work now done for MAT by MAEINC in Building 360. Current LIFT plan modifications do not include all recommended change. Very conservative estimate of annual cost avoidance by reduction of inventory is $367K.

4.4.2 Quick Fixes (6)

Applicability — Title/QFP Ref. Paragraph/Description

- MABPSC — Provide Raw Stock Cut to Rough Size to Mechanics; paragraph 8.3.1: Proposes that all raw material be cut to rough size in the storage area by one person, and then be given to mechanics, reducing wasted manhours. Estimated annual budget savings of $31K.

- MABPSC — Improve Material Handling and Floor Space Utilization for Arc Weld and Heat Treat Shop; paragraph 8.3.4: Proposes installing a bridge crane to replace present monorail hoist system. Estimated annual budget savings of $24K.

- MATPSI MATPSS — To Reduce End Item Assembly Time; paragraph 8.7.3: Recommends that visual inspection, nick and deburring operations now performed by MATPSS assembly mechanic be done in MATPSI (inspection). Estimated annual budget savings of $11K.

- MABPSC — Improve Process for Making ID Tags; paragraph 8.3.3: Proposes that part identification tags be made by single individual to relieve fabrication mechanics of the task. Estimated annual budget savings of $10K.

- MABPSC — Provide Freezer Chests Near Work Benches; paragraph 8.3.2: Proposes additional freezers be provided closer to the mechanics' work benches to eliminate the longer walking distances and numerous trips they are now making to retrieve material from the big freezer. Estimated annual budget savings of $4.7K.

- MABPSB — Reduce the C-5A Engine Inlet Cowl Panel Dye Penetrant Inspection Time; paragraph 8.2.1: Recommends performing this inspection in a portable booth in MABPSB rather than in back shop. Estimated annual budget savings of $2.7K.

The combined estimated annual budget savings for implementation of all SA-ALC focus study recommendations is $526K with an additional WIP reduction (cost avoidance) of $24.4M. The estimated combined annual budget savings from implementation of quick fix recommendations is $84K.

4.5 SACRAMENTO AIR LOGISTICS CENTER (SM-ALC)

Process characterization at SM-ALC included seven RCCs: MANPAB, MANPAC, MANPAD, MANPAM, MANPAN, MANPAR, and MANRTB. These RCCs are involved with F-111 wing repair, sheet metal repair, and Nondestructive Inspection (NDI). This characterization resulted in, one focus study, applicable command wide, which has a major impact on the environment, and 14 quick fix recommendations with estimated combined annual budget savings of $892K. After reviewing the proposed improvement opportunities with SM-ALC, these quick fixes and focus study were selected to be pursued and are included in the SM-ALC CSR and QFP. A summary of these improvement opportunities is provided in Tables 4.5-1 and 4.5-2 and in the following text.

4.5.1 Focus Study (1)

Applicability	Title/CSR Ref. Paragraph/Description
• MANPAB MANPAM MANPAN COMMAND WIDE	Alternate Blasting Methods; paragraphs 9.1.4, 9.4.4, 9.5.4: Proposes investigating alternate blasting methods to discern an environmentally safe and operationally superior method of removing sealant from the F-111 wing cavity as a replacement for the current water-pic operation. The technologies studied may have command wide applicability in the removal of sealants, corrosion, lubricants, epoxy adhesives, and bond form cleaning. The need for this technology was also identified in the pilot study performed by Southwest Research Institute.

4.5.2 Quick Fixes (14)

Applicability	Title/QFP Ref. Paragraph/Description
• MANPAB MANPAM MANPAN	Company Concept; paragraph 9.1.1, 9.4.1, 9.5.1: Proposes a reorganization of the current maintenance function at SM-ALC to give the responsibility of managing indirect activities (back shop RCCs) to the section F-111 wing manager. Estimated annual cost avoidance of $1,173K from work-in-process inventory reduction.

SM-ALC FOCUS STUDY RECOMMENDATION SUMMARY

TABLE 4.5-1

MDMSC RECOMMENDATION	IMPACT	ANNUAL BUDGET SAVINGS	COST AVOIDANCE			INVESTMENT COST
			FLOW TIME REDUCTION	WIP INVENTORY REDUCTION*	FLOOR SPACE REDUCTION	
ALTERNATE BLAST METHODS (MANPAB, MANPAM, MANPAN)	ENVIRONMENTAL IMPROVEMENT	$ 0	0 DAYS	$ 0	0 SQ. FT.	$380,000 **
TOTALS		$ 0	0 DAYS	$ 0	0 SQ. FT.	$380,000 **

NOTES: * WIP INVENTORY REDUCTION = $\frac{\text{\# OF FLOW DAYS REDUCED}}{\text{365DAYS}}$ X (ASSET $ VALUE) X (YEARLY PRODUCTION RATE)

** REPRESENTS FOCUS STUDY COST ONLY. IMPLEMENTATION COSTS TO BE IDENTIFIED BY FOCUS STUDY.

LSC-20532A

SM-ALC QUICK FIX RECOMMENDATION SUMMARY
TABLE 4.5-2 (SHEET 1 OF 2)

MDMSC RECOMMENDATION	IMPACT	BUDGET SAVINGS	COST AVOIDANCE			INVESTMENT COST
			FLOW TIME REDUCTION	WIP INVENTORY REDUCTION*	FLOOR SPACE REDUCTION	
COMPANY CONCEPT (MANPAB, MANPAM, MANPAN)	INVENTORY REDUCTION	$ 0	4 DAYS	$ 1,172,600	0 SQ. FT.	$ 50,000
MANPOWER LOADING (MANPAB, MANPAM, MANPAN)	DIRECT LABOR SAVINGS	$ 597,434	0 DAYS	$ 0	0 SQ. FT.	$ 35,000
WING SKIN TEMPLATE (MANPAN)	DIRECT LABOR SAVINGS	$ 207,153	0 DAYS	$ 0	0 SQ. FT.	$ 30,500
PRESSURE TESTER (MANPAN)	DIRECT LABOR SAVINGS	$ 0	1/2 DAY	$ 146,576	0 SQ. FT.	$ 20,000
ALODINE PROCESS/PLASTIC MEDIA DEPAINT (MANPAC, MANPAD)	INVENTORY REDUCTION	$ 0	8 DAY	$ 75,648	0 SQ. FT.	$ 55,000
HARNESS BUILD TEST (MANPAM))	DIRECT LABOR SAVINGS	$ 69,120	0 DAYS	$ 0	0 SQ. FT.	$ 47,000
F-111 CANOPY HATCH (MANPAR)	UPGRADE OPERATIONS	$ 19,200	0 DAYS	$ 0	0 SQ. FT.	UNDER CONTRACT
FASTENER SORT (MANPAN)	DIRECT LABOR SAVINGS	$ 18,439	0 DAYS	$ 0	0 SQ. FT.	$ 6,000
A-10 INLET FIXTURING (MANPAD)	DIRECT LABOR SAVINGS	$ 0	1 DAY	$ 5,588	0 SQ. FT.	$ 7,500
DYE PENETRANT CONTROL (MANRTB)	PROCESS QUALITY	$ 0	0 DAYS	$ 0	0 SQ. FT.	$ 2,500
MAGNETIC RUBBER CONTROL (MANRTB)	PROCESS QUALITY	$ 0	0 DAYS	$ 0	0 SQ. FT.	$ 2,500

NOTES:* WIP INVENTORY REDUCTION = $\frac{\text{\# OF FLOW DAYS REDUCED}}{\text{365DAYS}}$ X (ASSET $ VALUE) X (YEARLY PRODUCTION RATE)

LSC-20529B

SM-ALC QUICK FIX RECOMMENDATION SUMMARY
TABLE 4.5-2 (SHEET 2 OF 2)

MDMSC RECOMMENDATION	IMPACT	BUDGET SAVINGS	COST AVOIDANCE			INVESTMENT COST
			FLOW TIME REDUCTION	WIP INVENTORY REDUCTION*	FLOOR SPACE REDUCTION	
REDUCE NOISE LEVELS (MANPAC)	ENVIRONMENTAL IMPROVEMENT	$ 0	0 DAYS	$ 0	0 SQ. FT.	$ 60,000
RELOCATE TOOL CRIB (MANPAR)	SURGE CAPACITY	$ 0	0 DAYS	$ 0	0 SQ. FT.	UNDER CONTRACT
MATERIAL STORAGE IMPROVEMENT (MANPAR)	SPACE UTILIZATION	$ 0	0 DAYS	$ 0	7,000 SQ. FT.	UNDER CONTRACT
TOTALS		$ 892,146	13 1/2 DAYS	$ 1,300,412	7,000 SQ. FT.	$ 315,000

NOTES: * WIP INVENTORY REDUCTION = $\frac{\text{\# OF FLOW DAYS REDUCED}}{\text{365DAYS}}$ X (ASSET $ VALUE) X (YEARLY PRODUCTION RATE)

LSC-20529B

•	MANPAB MANPAM MANPAN	Manpower Loading; paragraphs 9.1.2, 9.4.2, 9.5.2: Proposes a redistribution of manpower between first and second shifts which captures operational savings by reducing the repair process flow days, increasing throughput, and reducing overtime needed to meet the aircraft division (MAB) schedule. Yearly savings of $597.4K may be realized if this improvement opportunity is successfully implemented.
•	MABPAN	F-111 Wing Skin - Template and Torque Wrenches; paragraph 9.5.3: Recommends the purchase of a template and appropriate numbers of air-operated torque wrenches to facilitate the reskinning of F-111 wings by MANPAN. Estimated annual budget savings of $207K.
•	MABPAN	Pressure Test Unit; paragraph 9.5.5: Recommends purchasing a second manometer to allow pressure testing of more than one wing at a time by MANPAM. Estimated annual cost avoidance of $146.6K through reduction of work-in-process inventory.
•	MANPAC MANPAD	Alodine Process/Plastic Media Depaint Process; paragraphs 9.2.2, 9.3.2: Recommends the addition of alodine treatment and the upgrade of the current blast booth (paint removal) within Building 475 adjacent MANPAC and MANPAD. This opportunity would reduce repair process flow days by eliminating back shop operations. A yearly work-in- process inventory reduction of $76.6K may result if this recommendation is successfully implemented. This recommendation further supports the SM-ALC "Company Concept" pilot program.

- MANPAM — Harness Build/Test; paragraph 9.4.3: Recommends the purchase of equipment to facilitate MANPAM in the testing and building of F-111 wing harnesses. Estimated annual budget savings of $69K

- MANPAR — Enhance Technology Base at MANPAR; paragraph 9.6.2: Recommends changing the responsibility of the repair process to allow MANPAR to align the F-111 hatch structure and install the hatch transparency on one fixture. Estimated annual budget savings of $19.2K.

- MANPAN — Fastener Sorting; paragraph 9.5.4: Recommends the sorting of F-111 wing top skin fasteners by an off-base sheltered workshop as opposed to MANPAN. Estimated annual budget savings of $18.5K.

- MANPAD — A-10 Inlet Fixturing; paragraph 9.3.1: Recommends the upgrade of a second drill fixture to provide back-up capability and to increase capacity for required drilling in MANPAD. Estimated annual cost avoidance of $5.6K due to reduction in WIP.

- MANRTB — Dye Penetrant Inspection Process Control; paragraph 9.7.1: Recommends adding process controls to ensure proper test conditions. Product quality improvement will reduce rework and repair.

- MANRTB — Magnetic Rubber Inspection Process Control; paragraph 9.7.2: Recommends adding process controls to ensure proper formulation of inspection material. Product quality improvement will reduce rework and repair.

- MANPAC — Noise Level Reduction; paragraph 9.2.1: Recommends the purchase of sound deadening hardware to isolate the noise-generating operation within MANPAC. This recommendation reduces a health/safety hazard.

- MANPAR — Relocate Tool Crib; paragraph 9.6.1: Recommends the relocation of a centrally-located tool crib within MANPAR to free up a rivet installation fixture currently blocked by the crib. No direct cost savings would result on implementing this recommendation.

- MANPAR — Improve Material Storage; paragraph 9.6.3: Recommends centralizing parts, free stock, and tools in one location to provide better control of items and free up 7,000 square feet of floor space within MANPAR.

The total estimated annual budget savings to be realized from implementation of all SM-ALC recommendations is $892K (see paragraph 1.0, Table 1.0-2).

4.6 WARNER ROBINS AIR LOGISTICS CENTER (WR-ALC)

Process characterization at WR-ALC included seven RCCs involving repair and modification of aircraft Gyroscope Reference Units (GRU) and repair of sheet metal components. The RCCs characterized are: MANPGA, MANPGB, MANPGC, MANPSA, MANPSB, MANPSC, and MANPSD. This process characterization resulted in four focus study recommendations with a combined estimated annual budget savings of $1,732K and 20 quick fixes with a combined estimated annual budget savings of $3,678K. Additional annual budget savings of $979K would be realized if WR-ALC were to implement change from two focus studies recommended by AGMC (see paragraph 1.0, Table 1.0-2 and paragraph 4.1.1)

After reviewing the proposed improvement opportunities with WR-ALC, these focus studies and quick fixes were selected to be pursued and are included in the WR-ALC CSR and QFP. A summary of these improvement opportunities is provided in Tables 4.6-1 and 4.6-2 and in the following text.

4.6.1 Focus Studies (4)

Applicability	Title/CSR Ref. Paragraph/Description
• MANPGA MANPGB MANPGC	Combine Gyro Rotor Assembly Repair to a Common Line Flow; paragraphs 10.1.4, 10.2.4, 10.3.4: Proposes investigation of efficient methods to reorganize RCCs MANPGA, MANPGB and MANPGC gyro rotor repair to improve process flow time while improving manpower, equipment, material handling and floor space utilization. Estimated annual budget savings of $448K.
• MANPSA	Redesign and Modify C-141 Aileron Check Fixture to Make a Working Jig in Lieu of Being Solely a Check Fixture; paragraph 10.4.4: Self explanatory. Estimated annual budget savings of $460K.

WR-ALC FOCUS STUDY RECOMMENDATION SUMMARY

TABLE 4.6-1

MDMSC RECOMMENDATION	IMPACT	ANNUAL BUDGET SAVINGS	COST AVOIDANCE			INVESTMENT COST
			FLOW TIME REDUCTION	WIP INVENTORY REDUCTION*	FLOOR SPACE REDUCTION	
COMBINE RCCS MANPGA, MANPGB, AND MANPGC GYRO ROTOR ASSEMBLY TO A COMMON LINE FLOW	DIRECT LABOR SAVINGS, ENVIRONMENTAL IMPROVEMENT, FLOOR SPACE REDUCTION	$ 447,873	N/Q UNTIL AFTER FOCUS STUDY	N/Q UNTIL AFTER FOCUS STUDY	N/Q UNTIL AFTER FOCUS STUDY	$ 25,000
REDESIGN AND MODIFICATION OF C-141 AILERON CHECK FIXTURE (MANPSA)	DIRECT LABOR SAVINGS	$ 460,414	0 DAYS	$ 0	0 SQ. FT.	$1,140,230
REDESIGN AND MODIFICATION OF C-141 PETAL DOOR JIGS (MANPSA)	DIRECT LABOR SAVINGS	$ 286,080	0 DAYS	$ 0	0 SQ. FT.	$1,140,230
REDESIGN AND MODIFICATION OF C-141 AFT COWL JIGS (MANPSC)	DIRECT LABOR SAVINGS	$ 537,316	0 DAYS	$ 0	0 SQ. FT.	$1,140,230
[ALTERNATE FOCUS STUDY]** C-141 AILERON, PETAL DOOR, AND AFT COWL TOOLING (MANPSA, MANPSC)	DIRECT LABOR SAVINGS	$1,283,861	0 DAYS	$ 0	0 SQ. FT.	$3,080,691
ALTERNATE TOTALS		$1,731,734A				$3,105,691A
TOTALS***		$1,731,683	0 DAYS	$0	0 SQ. FT.	$3,445,690

NOTES:
- * WIP INVENTORY REDUCTION = $\frac{\text{\# OF FLOW DAYS REDUCED}}{\text{365DAYS}}$ X (ASSET $ VALUE) X (YEARLY PRODUCTION RATE)
- ** THIS ALTERNATE FOCUS STUDY RECOMMENDATION (FSR) COMBINES AND REPLACES THE THREE MANPS FSRs ABOVE IT, REDUCING INVESTMENT COST BY $340K.
- *** ADDITIONAL SAVINGS/COSTS FROM IMPLEMENTATION OF TWO AGMC FOCUS STUDIES ARE NOT INCLUDED HERE. (SEE PARAGRAPH 2.0, TABLE 2.0-2)

LSC-20609A

WR-ALC QUICK FIX RECOMMENDATION SUMMARY
TABLE 4.6-2 (SHEET 1 OF 2)

MDMSC RECOMMENDATION	IMPACT	ANNUAL BUDGET SAVINGS	COST AVOIDANCE			INVESTMENT COST
			FLOW TIME REDUCTION	WIP INVENTORY REDUCTION*	FLOOR SPACE REDUCTION	
DEVELOP MECHANICS HANDBOOK (MANPSA, PSB, PSC, PSD)	DIRECT LABOR SAVINGS	$1,598,706	0 DAYS	$ 0	0 SQ. FT.	$ 28,000
PROVIDE PICTORIAL DRAWINGS IN WCDS (MANPSA, PSB, PSC, PSD)	DIRECT LABOR SAVINGS	INCLUDED IN ABOVE	0 DAYS	$ 0	0 SQ. FT.	$ 20,000
MECHANICS TOOL SET (MANPSA, PSB, PSC, PSD)	DIRECT LABOR SAVINGS	$ 476,679	0 DAYS	$ 0	981 SQ. FT.	$ 95,336
COBALT-TIPPED DRILL BITS (MANPSA, PSB, PSC, PSD)	DIRECT LABOR SAVINGS	$ 476,679	0 DAYS	$ 0	0 SQ. FT.	$ 10,000
ELIMINATE CLEAN ROOM GARB (MANPGA)	DIRECT LABOR SAVINGS	$ 436,977	0 DAYS	$ 0	0 SQ. FT.	$ 16,600
RADOME SUPPORT FIXTURE (MANPSD)	DIRECT LABOR SAVINGS	$ 248,075	0 DAYS	$ 0	0 SQ. FT.	$ 40,000
VENT MASS SPECTROMETERS (MANPGA)	DIRECT LABOR SAVINGS & ENVIRONMENTAL IMPROVEMENT	$ 101,152	0 DAYS	$ 0	0 SQ. FT.	$ 4,000
CERTIFY BRAZING MECHANIC (MANPSA)	DIRECT LABOR SAVINGS & INVENTORY REDUCTION	$ 60,691	UNDERWAY	-	-	UNDERWAY
RELOCATE BOND MECHANICS (MANPSA)	DIRECT LABOR SAVINGS	$ 57,530	0 DAYS	$ 0	0 SQ. FT.	NEGLIGIBLE
IMPROVE TAPE REBONDING (MANPGB)	DIRECT LABOR SAVINGS	$ 40,244	0 DAYS	$ 0	0 SQ. FT.	$ 2,562
TOTALS						

NOTES: * WIP INVENTORY REDUCTION = $\frac{\text{\# OF FLOW DAYS REDUCED}}{\text{365DAYS}}$ X (ASSET $ VALUE) X (YEARLY PRODUCTION RATE)

LSC-20607A

WR-ALC QUICK FIX RECOMMENDATION SUMMARY
TABLE 4.6-2 (SHEET 2 OF 2)

MDMSC RECOMMENDATION	IMPACT	ANNUAL BUDGET SAVINGS	COST AVOIDANCE			INVESTMENT COST
			FLOW TIME REDUCTION	WIP INVENTORY REDUCTION*	FLOOR SPACE REDUCTION	
FIXTURE INDUCTION MACHINE (MANPGA, PGB, PGC)	DIRECT LABOR SAVINGS	$ 39,266	0 DAYS	$ 0	0 SQ. FT.	$ 10,690
AILERON TAB HINGE LOCATOR TOOL (MANPSA)	DIRECT LABOR SAVINGS	$ 15,963	0 DAYS	$ 0	0 SQ. FT.	$ 7,500
NEWSPAPER CLIPPING CUTTER TOOL (MANPSA)	DIRECT LABOR SAVINGS	$ 15,173	0 DAYS	$ 0	0 SQ. FT.	$ 1,600
RELOCATE MASS SPECTROMETERS (MANPGB)	DIRECT LABOR SAVINGS & ENVIRONMENTAL IMPROVEMENT	$ 11,977	0 DAYS	$ 0	0 SQ. FT.	$ 3,759
IMPROVE DRIFT DECISIONS (MANPGC)	DIRECT LABOR SAVINGS	$ 11,519	0 DAYS	$ 0	0 SQ. FT.	$ 10,000
IMPROVE BEARING HANDLING (MANPGA, PGB, PGC)	MATERIAL SAVINGS	$ 6,600	0 DAYS	20% YIELD IMPROVEMENT	0 SQ. FT.	$ 5,264
RE-EVALUATE DIAGNOSTIC CHECKS (MANPGA, PGB, PGC)	DIRECT LABOR SAVINGS	$ 4,191	0 DAYS	$ 0	0 SQ. FT.	NEGLIGIBLE
PROVIDE LEVEL SUPPORT TABLES (MANPSA)	DIRECT LABOR SAVINGS	$ 2,008	0 DAYS	$ 0	0 SQ. FT.	$ 1,500
COMBINE AFT COWL REPAIR OPERATIONS (MANPSA)	DIRECT LABOR SAVINGS	N/Q	0 DAYS	$ 0	0 SQ. FT.	NEGLIGIBLE
ALODINE BRUSH CAPABILITY (MANPSD)	FLOW TIME REDUCTION	EXISTING ALC STUDY	0 DAYS	$ 0	0 SQ. FT.	NEGLIGIBLE
TOTALS		$3,678,424	0 DAYS	$0	981 SQ. FT.	$256,811

NOTES: * WIP INVENTORY REDUCTION = $\frac{\text{\# OF FLOW DAYS REDUCED}}{\text{365DAYS}}$ X (ASSET $ VALUE) X (YEARLY PRODUCTION RATE)

LSC-20607A

• MANPSA	RCC MANPSA/WR-ALC to Redesign and Modify C-141 Petal Door Working Jigs to Allow a Greater Part of the Repair Effort to be Accomplished in the Jig; paragraph 10.4.5: Self explanatory. Estimated annual budget savings of $286K.
• MANPSC	RCC MANPSC/WR-ALC to Redesign and Modify the Existing C-141 Aft Cowling Jigs R/L to Increase Jig Utilization Time from the Present 20% to a Goal of 90%; paragraph 10.6.4: Self explanatory. Estimated annual budget savings of $537K.

4.6.2 Quick Fixes (20)

Applicability	Title/QFP Ref. Paragraph/Description
• MANPSA MANPSB MANPSC MANPSD	Develop a Mechanic's Handbook for Each Repaired Assembly; paragraphs 10.4.1, 10.5.1, 10.6.1, 10.7.1: Proposes a new reference to compliment and supplement the Technical Orders and document all major steps and techniques of each repaired assembly unit. The manual would be invaluable to new or less experienced mechanics in a rapid build-up surge or war-time readiness situation or where a production rate increase would be necessary. Estimated annual budget savings of $1,599K.
• MANPSA MANPSB MANPSC MANPSD	Provide Pictorial Drawings With the Existing Workbooks (WCDs); paragraphs 10.4.9, 10.5.3, 10.6.3, 10.7.5: Recommends visual aids in reference documents to assist the worker to better understand the required task and to help train others in a surge or war-time emergency situation. Estimated annual budget savings for this quick fix are included in the Mechanic's Handbook Quick Fix (see Table 4.6-2, Sheet 1).

- MANPSA — Implement Program for the Mechanic to Buy and Maintain Own Handtools; paragraphs 10.4.2, 10.5.2, 10.6.2, 10.7.4: Proposes an individual tool ownership plan to eliminate/reduce the number of tools/boxes/stands, tool crib manpower and purchasing expense. The plan will provide the necessary tools to work with and make the worker responsible for the tool inventory and the replacement of broken handtools. Estimated annual budget savings of $477K.

- MANPSA — Make Available Cobalt-Tipped Drill Bits, or Equivalent; paragraphs 10.4.10, 10.5.4, 10.6.4, 10.7.6: Proposes use of more durable drill bits in lieu of resharpened drill bits, for mechanics to drill out aluminum rivets and other fasteners such as steel bolts and blind steel rivets. Estimated annual budget savings of $477K.

- MANPGA — Eliminate Clean Room Garb Requirements In MANPGA; paragraph 10.1.1: Proposes an evaluation of Technical Order requirements to determine the feasibility of eliminating non-productive Class 100,000 clean room "suits" for most, if not all, personnel working within the RCC. Estimated annual budget savings of $437K.

- MANPSD — Provide Holding/Support Fixtures for All Radomes; paragraph 10.7.1: Recommends new fixtures to hold the radome on its side and to allow the radome to be rotated providing better access and less worker strain. This fixture would be similar to the one currently used for C-141 nozzle repair. Estimated annual budget savings of $248K.

•	MANPGA	Vent the Vacuum Pumps of the Mass Spectrometers; paragraph 10.1.2: Recommends modifying the exhaust venting and utilizing equipment currently available to improve throughput of gyro leak checking operations. Estimated annual budget savings of $101K.
•	MANPSA	Certify the Mechanic Repairing the C-141 Horizontal Stabilizer; paragraph 10.4.7: Recommends mechanic training and certification on the use of an ohmmeter and brazing units to check the continuity of the wiring and the mesh heating elements. This will relieve the mechanic from making at least four trips to the back shop for repair verification. Estimated annual budget savings of $60.7K.
•	MANPSA	Move Bond Mechanics Closer to the Autoclaves; paragraph 10.4.3: Recommends relocating bond mechanics to reduce transit time. Estimated annual budget savings of $58K.
•	MANPGB	Improve Bonding of PCN 20012A Tapes in MANPGB; paragraph 10.2.1: Proposes acquiring a thermo-compression bonder to allow rebonding of separated, undamaged tape which is currently scrapped. Estimated annual budget savings of $40K.
•	MANPGA MANPGB MANPGC	Improve Fixturing the Induction Machines in MANPGA, MANPGB and MANPGC; paragraphs 10.1.4, 10.2.4, 10.3.3: Proposes a consistent fixturing methodology for gyro desoldering activities to improve safety and product quality. Estimated annual budget savings of $39K.

- MANPSA — Design/Build An Aileron Tab Hinge Locator; paragraph 10.4.5: Recommends creating a device to aid in the replacement and correct shimming of the aileron tab hinge fittings on the C-141 aileron rear beam. The current procedure of using the tab assembly as a tool is difficult because the tab leading edge is obstructing. Estimated annual budget savings of $16K.

- MANPSA — Design/Build a Type of Newspaper Clipping Cutter; paragraph 10.4.6: Recommends developing a new tool to assist in the cutting of thin (.005) skins on the C-141 horizontal stabilizer leading edges. This tool would be similar to one used to cut wood veneers. The new tool would replace the current method of using makeshift tools. Estimated annual budget savings of $15K.

- MANPGB — Relocate Mass Spectrometers; paragraph 10.2.2: Proposes eliminating nonproductive transit times away from the gyro seal repair area. Potential air contamination of the mass spectrometers could be solved by improved ventilation and/or duct work, if necessary. Estimated annual budget savings of $12K.

- MANPGC — Improve Random Drift Decisions; paragraph 10.3.1: Proposes implementation of a decision panel device to minimize the frequency of testing defective gyros. Estimated annual budget savings of $11.5K.

- MANPGA, MANPGB, MANPGC — Improve Gimbal/Spin Bearing Handling; paragraphs 10.1.3, 10.2.3, 10.3.2: Proposes establishing better material handling techniques to increase the yield of bearing refurbishment operations. Estimated annual budget savings of $6.6K.

- MANPGA MANPGB MANPGC — Re-evaluate Need for Diagnostic Checks; paragraphs 10.1.5, 10.2.5, 10.3.4: Proposes eliminating the limited value diagnostic testing for certain gyroscopes. Based on historical E046B data, when wheel repair occurrence factors of 90% and greater are noted, this change can produce a cost benefit. Estimated annual budget savings for the 74146A gyro alone could be $4.2K.

- MANPSA — Provide Level Aileron Support Tables; paragraph 10.4.4: Recommends a means of eliminating the time needed to make existing tables level. Estimated annual budget savings of $2K.

- MANPSA — Combine Repair Operations for the C-141 Aft Cowl Door; paragraph 10.4.8: Recommends completing the entire repair/rework effort in one work area rather than the current three. This will eliminate redundant effort and decrease the flow time for the unit (not quantifiable).

- MANPSA — Brush Alodine Treatment Capability for Building 603; paragraph 10.7.2: Recommends implementing a new alodine process locally to eliminate the transportation of parts to Building 180 about two miles away. This is currently under study as both a temporary and a permanent solution to the situation. (Existing study-no cost savings available.)

WR-ALC can realize an estimated $5,410K in recurring budget savings if recommendations from all of its focus studies and quick fixes are implemented. In addition, if recommendations from the two focus studies proposed by AGMC are also implemented at WR-ALC, the combined estimated annual budget savings for WR-ALC would increase to $6,389K. (See paragraph 1.0, Table 1.0-2 and paragraph 4.1, Table 4.1-1).